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The Design, implementation and Evaluation of a Technology Solution to Improve Discharge Planning Communication in a Complex Patient Population

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Abstract

Unnecessary delays in discharge planning can extend the length of stay (LOS) and add non-reimbursable days for socially and medically complex patients thereby increasing the financial burden to healthcare organizations. The literature supports enhanced discharge communication strategies and the use of checklists to facilitate safe and timely discharges. Following root cause analyses of significant discharge delays, one hospital identified gaps in communication as key precursors associated with discharge planning breakdown when discharging patients to skilled nursing facilities. Review of these events demonstrated the need for concurrent communication strategies between multidisciplinary care team members in planning for complex discharges.

Following a complete assessment of the current discharge planning process, a web-based interactive discharge checklist was designed, implemented and evaluated in the attempt to provide guided communications to the essential partners of the patient's team in an effort to reduce LOS and readmissions. After a six-month rollout of the new technology and concomitant procedures, the analyses revealed improvement in both the patient's perception of discharge planning and the ability to discharge patients by noon. Results for LOS and readmission demonstrated inconsistent improvement. The use of an electronic checklist as a communication tool did reduce variability in discharge procedures and provided for continuity in handoff communication between team members. Staff agreed it promoted continuity and improved efficiency.

Key Words: Discharge Planning, Care Coordination, Handoffs, Length of Stay, and Technology

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Introduction

The pressure to reduce readmissions and length of stay is becoming paramount in medical centers across the United States as healthcare reimbursements shrink and penalties are levied. However, the complexity of patient post-hospitalization needs as well as the changing post-discharge environment significantly impacts the acute care hospital's ability to discharge patients safely and in a timely manner. Patients with social and behavioral health co-morbidities or with limited financial resources have restricted placement options when compared to patients who have strong funding sources and otherwise straightforward care needs. These barriers to discharge create unprecedented challenges for organizations in finding safe alternatives for complex patients requiring skilled post discharge care. Increasingly, patients with formidable obstacles to discharge remain in inpatient beds on unpaid status while safe transition options are actively pursued. These variance days add unbillable cost to the organization that reduces the financial margin. In addition, the inability to transition patients when medically ready impacts hospital throughput by reducing the number of available elective beds and thereby compounding the affect to the fiscal bottom-line.

The setting for this project is a 413-bed academic, regional referral, and safety net hospital located in the state of Washington. This medical center serves as the only Level-One Trauma and Regional Burn Center in a four-state area and provides care for the most complex patients from Washington, Alaska, Montana, and Idaho (WAMI region). The mission statement includes serving the following populations: persons incarcerated in King County jail, mentally ill patients, persons with sexually transmitted diseases, substance abusers, indigents without third-

party coverage, and other vulnerable populations. This high-risk population provides increased challenges in providing safe, post-discharge placement due to lack of funding, history of criminal convictions or behavioral outbursts, and substance abuse issues.

This trauma center has an open-door policy and as such there are no diversions. The front door is always open and patients continue to come from wide geographic areas creating overcrowding situations when patients cannot be discharged in a timely manner. The back door, or discharging patients to skilled nursing facilities, however has become increasingly difficult for this facility due to both internal and external factors. This mismatch of admissions to discharges has led to severe overcrowding conditions when patients could not be discharged after they met discharge criteria. The overcapacity issues led to patients being boarded in the emergency department and in nursing unit hallways thereby limiting the ability to admit elective surgical patients. The elective population is an essential component in meeting the financial targets for the organization as a means to help offset the cost of caring for the mission population. Limiting elective admissions is not a long-term sustainable solution.

There are several external factors that have contributed to the difficulties in discharging complex patients to skilled nursing facilities. Seven years ago, the Washington State legislature approved a measure to cut 200 skilled nursing facility (SNF) beds in several counties proximal to the hospital and with that placed a moratorium in place to limit new SNF's from opening. At the time the law was passed the legislature believed the community to be over-bedded with skilled nursing homes. This reduction in bed capacity significantly decreased the available supply of post-discharge beds for patients requiring skilled care. Before this legislative measure, all patients, even those with complex social histories could be placed following discharge given the abundance of beds in the community.

The community offered facilities subsidized by the state for specialized populations such as those with HIV, alcohol and drug addiction. There were specific beds dedicated to homeless women and separate facilities for homeless men who required post discharge care. After the reduction in beds a much predicted battle for beds emerged. The law of supply and demand resulted in pre-selection of the most desirable patients on the part of the skilled nursing facilities, leaving the most difficult, complex patients languishing in inpatient beds long after they met discharge criteria. Washington residents, on the other hand, with good payment sources, limited care needs, and without behavioral or addiction issues had little problem finding placement and frequently captured the only available aftercare beds leaving no availably for the complex patient.

Further exacerbating the problem for this safety net hospital was another state ruling that altered the procedure for undocumented workers that required post discharge services. Patients that were considered non U.S. citizens and therefore not eligible for Medicaid, could now not be admitted to any open community SNF bed but rather consigned only to those designated as Alien Emergency Medical (AEM) beds. Prior to this regulatory change, AEM patients could be admitted to any SNF bed upon meeting admission criteria. With this governing change, AEM services in the State of Washington were severely cut, limiting the number of skilled nursing (AEM) beds to 42 in the entire state. This created a high demand situation for those few beds.

The state boasts a large $46 billion food and agriculture industry and employs approximately 160,000 people that contribute 13% percent to the state's economy (agr.wa.gov). Although the Washington State law does not condone the hiring of non-citizen workers, the fact remains that this hospital experienced a regular inflow of AEM patients from the farming communities due to traumatic injuries that required level-one trauma care. Due to their injuries,

these workers were frequently airlifted and admitted for treatment. Following the course of care however, due to the limited number of AEM beds, undocumented patients could not be placed into a skilled bed until such AEM designated SNF bed became available. The waiting lists became inordinately long with delays up to three and four months for these limited resources adding many non-reimbursable days to the hospital length of stay.

Compounding this challenging situation, Washington State Medicaid subsequently reduced payments to SNFs from $200/per day to $160/day, making it more difficult for patients requiring additional therapy treatments or expensive medications to be considered for placement. It was not uncommon for patients with complex care needs, challenging social histories and without insurance to be rejected by over 160 placement facilities and wait for months to be accepted into an aftercare facility. This constellation of events resulted in overcapacity census volumes with occupancy rates from 95-107% at any given time. Multiple barriers to discharge extended the length of stay (LOS) adding unpaid days with increased expense, and reduced available beds for emergent and elective patients seeking care at this facility. Census management and improving throughput by reducing LOS became the organizational focus of the executive leadership team.

Background Knowledge

In early 2000, a Length of Stay Committee (LOSC) was convened to identify opportunities to improve throughput after experiencing a rise in Emergency Department boarding. At that time patients with complex discharge needs were rare and based on data collected, comprised 10 to 15 percent of the acute care inpatient population. The LOSC defined complex patients as those patients having one or more co-morbidities including: psychiatric disorders, drug, alcohol or nicotine addiction, morbid obesity, large but stable wounds; patients

requiring additional equipment or increased therapy time, tracheotomies and/or respiratory needs or those patients requiring long courses of expensive antibiotics. Any one of these stipulations increased placement challenges in discharge planning and post hospitalization placement. Over the next few years, the LOSC identified and addressed numerous gaps to improve throughput and shorten LOS but with little sustained improvement. As one issue resolved a new issue arose.

By 2006, high census days with patient boarding were becoming more frequent resulting in the Emergency Department diverting basic life support (BLS) patients to other facilities to maintain trauma capacity. It was at this time, the LOSC was charged with performing an assessment of the current state and providing a proposal to address the throughput issues. The percentage of inpatients meeting the complexity scale had increased to over 50 percent in the prior six-year period. The rise in percentage was assumed to be in part due to a reduction in the admission of lower acuity patients and higher volumes of acute trauma patients with co-morbid conditions. This discovery led to a complete change in the discharge-planning model.

Up until 2006, the bedside nurses were responsible for all discharge planning with limited help from a social worker when patients required placement to skilled nursing facilities. The overall effect of the increasing acuity and complexity of patient assignments resulted in bedside nurses prioritizing discharge planning to the bottom of the list of activities. Twelve-hour shifts with three to four days off per week contributed to the discontinuity of discharge planning.

Further complicating the discharge process was the procedure for social worker coverage. The structure at the time assigned social workers by service lines (e.g., medicine, orthopedics) resulting in varying workloads. Some social workers had caseloads of over 50 patients per day while others had less than twenty. Each social worker would round with the service physicians to understand the patient's plan of care requiring many hours out of the day. Time constraints and

limited electronic medical record (EMR) capabilities left the bedside nurse frequently out of the loop on movement toward discharge. Many attempts were made to increase communication about discharge through education and directives with little sustained success. The LOS continued to rise and the LOSC recommended a revamping of the discharge planning process.

The Unit Discharge Facilitator (UDF) Program was created in April 2006, designed to support the complex patient and care team through the discharge process. The executive team unanimously approved the multi-million dollar investment necessary to create this program. Discharge teams consisting of a UDF and SW were placed on every inpatient ward with the intention that the UDF proactively guide the team to quick and efficient discharge. The UDF is a registered nurse responsible for coordinating care with multidisciplinary team members (i.e., nursing, social work, financial counseling, pharmacy, physicians, utilization management, and rehab therapy) in order to establish a discharge plan and proactively mitigate any obstacles to discharge with the goal of reducing length of stay (LOS) and preventing uncompensated days (see Appendix A for UDF job description).

Local Problem

Within six months the UDF program demonstrated improvement in reducing LOS. The tenets of the program and additional resources gave structure to the discharge planning process. The improvement was short-lived however and within a few years the barriers to discharge became unyielding, throughput again stalled and the LOS metric began to rise. At this time the LOSC was disbanded and the Transformation of Care Committee (TOCC) was created as a component of a new and more formalized Process Improvement (PI) program. Given ongoing issues with overcrowding and increases in LOS, the TOCC was asked by the executive team to critically examine the UDF Program and identify opportunities for rapid improvement in

throughput and reduction in LOS. The author of this paper was elected chairperson of the Transformation of Care Committee.

With full approval of the executive leadership team, authority was given to the chair of the TOCC, to design an innovative solution to improve throughput, reduce LOS and reduce readmissions. The executive team issued a directive that the UDF program resources would be cut from the budget without significant demonstration of improvement. The review began in July 2009 by performing root cause analyses (RCA) on cases with significant avoidable days due to human factors, process flow, and systems issues. Data analyses as well as interviews with interdisciplinary team members were analyzed. Numerous issues emerged including ineffective leadership, poor employee performers, and lack of standardized processes, unclear role differentiation, unstructured workflows and poor utilization of resources. Over a two-year period much work was completed to redefine the program, insert proper leadership, streamline workflows, clarify role definition and establish process structure.

As part of the ongoing process improvement process, RCAs on noteworthy discharge delays continued. It was from these reviews that communication breakdown was identified as a significant factor resulting in a discharge interruption. Drilling down on the communication breakdowns led to significant discoveries.

Although discipline-specific discharge information was available, it was noted to be documented in silo-fashion and difficult to locate. The inability to locate comprehensive discharge information created situations whereby the multidisciplinary team did not have access to the complete picture for the patient or the required sequential actions that must occur to meet timely discharge objectives. One finding led to the fact that each department had separate and discrete computer systems that did not interface with one another and in which progress toward

discharge was documented separately and locally contributing to the breakdown in communication. To illustrate this point, the financial counseling (FC) team documented preauthorization for insurance for SNF placement, rehab coverage, and discharge medications in a unique system called CAT accessed only with restricted entry by the FC team. The UDF's, pharmacists, social workers and rehab therapists all required access to this information to move forward with discharge planning but only the financial counselors had knowledge of the preauthorization status. This routinely delayed discharge facilitation.

Creating more opacity in attempting to construct the complete discharge picture was the fact that utilization management (UM) staff documented in a proprietary 3M™ tool and pharmacy documented in PharmNet™; again neither of which interfaced with the EMR thereby prohibiting information flow to the team. Further exploration uncovered that three highly involved services i.e., social work, rehab therapies, and nutrition, all document in the EMR however, each discipline had a separate note that required sorting chronologically to locate relevant details about discharge. It became onerous for the UDF or any member of the care team to envisage the big picture of a patient's discharge roadmap without taking many hours to mine through various repositories and making numerous phone calls.

A "huddle round" or team discharge conference was implemented daily on each inpatient nursing unit to integrate the key pieces of information in an attempt to mitigate this communication quagmire. Morning huddles were intended to bring the care team together to specifically discuss the plan for discharge. Upon further investigation it became clear that the morning huddles did not fully solve the communication gap for a number of reasons. The structure of the huddle rounds mandated that the entire team be present for 30 minutes to quickly review all discharge plans for each patient on the ward. The objective was to bring forth the

most up to date information to these rounds from all disciplines and establish next steps. Continuity of attendance was essential. Almost immediately various team members were unable to attend due to legitimate patient care priorities. Scenarios ranged from the bedside nurse attending to a crashing patient to the physician being called to the emergency room. This resulted in important information being confined to the missing worker or buried in reams of documentation making this information unavailable. When any essential team member missed the morning huddle rounds crucial information was lost to the team. It became apparent that even with daily huddles pivotal information was not fully or easily disseminated.

The tedious nature of obtaining the entire picture of progress towards discharge, and the inability to identify gaps in preparedness for discharge, resulted in system-based delays and missed opportunities for discharge. Continuing to drill down on issues through the RCA process led to further granularity of the issues. One such case identified a unique twist on timely information: the need to establish and communicate priorities within priorities (see Appendix B for RCA).

Routinely team members created their own to-do lists based on their own priorities and worked diligently to complete these tasks. Many worked on different priorities unaware of a specific need for focused attention on one particular patient. When a pressing situation occurred it became crucial to mobilize the team quickly to facilitate a specific individual's discharge. The ability to orchestrate activities became vital in situations with extremely challenging patients and limited discharge opportunities. At the point in time when a discharge opportunity arises, pharmacy, physical therapy, social work, financial counseling, nursing, and the medical staff must all synchronize efforts to ensure all milestones are complete to meet the specific date and

time of discharge. In this case the patient missed the discharge opportunity due to the lack of communication in obtaining preauthorization for discharge medications.

The challenge became how to provide transparent ongoing communication to all members of the care team who are located in different parts of the hospital. The complexity of communicating essential information in a non-interfacing mosaic EMR became a formidable impediment. Without the ability to interface systems and consolidate information it became clear that a discrete technology solution might be the answer to improve communication.

Intended Improvement

The evidence supports communication as a key factor in aligning goals and targets for discharge as a way to improve discharge timeliness (Foust, 2007). The goal of this evidence-based project was to improve on known strategies for the communication of relevant discharge-planning information by integrating a technology solution that would enhance knowledge sharing for members of the care team. The need for continuity of information between team members when planning for complex discharges was deemed essential in securing exiguous post discharge placements. Thus, the intention of this project was to create a real-time electronic communication pathway for all team members to share pertinent discharge planning information in order to expedite the process and reduced length of stay. For this reason, the chairperson of the TOCC and author of this paper proposed using an evidenced-based approach to address the problem in discharge coordination.

Aim Statement:

The Medical Center will redesign its discharge communication platform for all patients admitted to the acute care units. This will be accomplished through recognition that transparent communication practices are vital in providing safe and timely transitions to post-acute care

treatment and to improving hospital throughput. The process improvement measures were expected to be implemented within twelve months (December 2012) and to demonstrate improvement within the ensuing six months (by June 2013). The population of concern includes all patients with complex social histories, co-morbid conditions, financial implications and others with challenges for post-hospitalization placement. The TOCC made the decision with the full support of the executive team to move forward with this process improvement initiative based on the growing concerns about high census and throughput issues. Success will be achieved by monitoring the following measures:

- LOS < 6.4
- > 15% discharges by noon
- > 90% patient satisfaction with the discharge process
- < 10% readmission rates
- Staff satisfaction with process change

Purpose of Change

The test of change addressed the following question. Can a technology solution be designed and utilized to enhance handoff communication practices that will provide multidisciplinary care team members with necessary and timely information in order to 1) facilitate group priority setting and 2) meet each patient's milestones for discharge?

The purpose of this project was to apply information technology in the design of an effective mode of real-time communication that would streamline information flow and improve handoffs in the discharge planning process. The intention was to create an electronic tool that would establish a single portal for entry and viewing of all relevant discharge information eliminating the need to search through numerous repositories and disparate information systems

to locate essential information. The platform would consolidate all discharge information into one location and provide a single view where all members of the care team could visualize the patient's roadmap toward discharge at a glance and in real-time. One critical objective was to establish an interactive mode of communication that would grant the UDF, social worker or any member of the care team, the ability to update the information from any location in the hospital in order to relay changes in patient status to help expedite priorities to meet discharge targets. The final product would provide a visual display of patients in various stages toward discharge highlighting priorities, barriers and milestone completion.

Review of the Evidence – Discharge Planning

The Patient Protection and Affordable Care Act and value-based purchasing requirements are driving organizations to reconsider processes that will improve patient outcomes and strengthen the financial bottom line. The pressure to reduce length of stay and readmission rates is intensifying in medical centers across the nation as healthcare reimbursements shrink and penalties are levied based on quality indicators. Planning for safe and timely discharge is among the top list of practices that require review and are the focus of numerous articles, conferences and round-table conversations searching for evidence-based guidance. According to the Agency for Healthcare Research and Quality, providing a safe discharge transition is essential in preventing adverse health consequences upon release from an acute inpatient setting (AHRQ 2012).

The complexity of patient post-discharge needs as well as the changing post-discharge environment significantly impacts the acute care hospitals' ability to discharge patients safely and in a timely manner. Elderly patients and patients with social and behavioral health co-morbidities have challenges frequently overlooked during the inpatient stay resulting in return

emergency department visits and readmissions. These complexities in discharge planning create unprecedented challenges for organizations in meeting federal and regulatory quality indicators.

The aim of this literature review is to synthesize and present previous research focused on proven strategies that reduce length of stay (LOS) and readmission rates by improving the quality of discharge planning. To formulate the questions to guide the search, the PICOT format is utilized:

P - patients discharged from hospitals that are high risk for readmission

I - tools to improve the discharge process that enhance communication

C – specific intervention

O – decreased LOS, decrease readmission rates, enhanced throughput

T – within 30 days of discharge

Two key questions narrowed the search strategy: what are the known factors to enhance or hinder team communication in discharge planning? What tested strategies facilitate reducing LOS and /or readmission rates in patients discharged from an inpatient setting? Improving on known strategies for discharge planning has broad implications for hospitals in the era of health care reform.

The literature review was initially undertaken using eight search terms to electronically scan CINAHL, Medline, PubMed, Cochrane, Ovid, NCBI, NLM, and Google Scholar databases focusing on studies published between 2003-2013. The following groups of key words and Medical Subject Headings (MeSH) were combined in various sequences using the Boolean terms “and” and “or” in the searches: (1) care coordination, (2) discharge planning, (3) continuity of care, (4) randomized controlled trial (RCT), (5) communication, (6) technology, (7) length of

stay (LOS), and (8) readmissions. Reference lists and author searches were subsequently incorporated.

The electronic database search yielded 7064 titles and abstracts. These were screened for duplication, relevance to topic, and specificity to nursing, year published and quality of research. Opinion pieces, quality improvement and personal case histories were also excluded leaving 48 manuscripts to be eligible for inclusion in this review. The ten publications included in this review provide a combination of quantitative and qualitative research including meta-analysis. Key considerations in the selection of these articles are the strength of evidence, relevance to the topic, and applicability to improve upon known strategies in discharge planning. The Johns Hopkins Nursing Evidence-based Practices rating scale is used to rate the strength and quality of the research (Dearholt & Dang, 2012).

All studies reviewed were published from 2005 – 2012 in an attempt to capture the most relevant and current information on a variety of discharge enhancement strategies. The articles were published in nine different journals and one was published as a review in the Cochrane Database of Systematic Reviews. Six reviews were randomized controlled trials, one was a qualitative designed study, two were meta-analyses of RCTs and one was an integrative review of quantitative, qualitative and combined quantitative and qualitative studies. Six studies were performed in American hospitals and four studies were conducted internationally (see Appendix C for evidence summary table/discharge planning).

For the purpose of this review, all studies reflected a concern for the need to enhance discharge planning as a mode to improve patient readiness for discharge and as a strategy to reduce LOS and readmission. Foust (2007) understood the complex aspects of discharge planning in the context of the nurses competing priorities. As the author of study (2), Foust

reports on a qualitative design that follows the naturalistic paradigm of observing eight nurses throughout their working shift. The outcome of the study was to capture the evolving nature of discharge planning. The major findings demonstrated that nurses' expectations of patients' progress guided their discharge assessments, teaching and planning over time and that discharge teaching became more of a priority as discharge became imminent. A gap between observed and documented discharge planning was observed which poses significant challenges for nurses in completing and communicating the plan for post discharge care (Foust, 2007).

Gaps in early needs assessment, communication to patient and provider, education, hand offs, and post-discharge care instructions can affect the patients timely discharge home and ability for self care post discharge. Multiple studies in this review described a variety of interventions attempted and each with slight permutations resulting in the emergence of several common themes. Each intervention targeted a specific vulnerability in the discharge continuum.

Two studies (3, 4) focused on the role of a specified discharge nurse or nurse advocate to design an individualized plan based on patient information. Both programs emphasized early identification of discharge needs and the formalization of the discharge plan by providing written information in the form of handouts. In both studies the nurses provided specific education using targeted patient instructional brochures and information. In one study (3) the patient receive a follow up home visit and also follow-up phone calls. In the other study (4) there was a follow-up phone call provided by a pharmacist. In study (3) all indicators of outcomes were significantly better for patients in the intervention group (IG) than in the control group (CG). Both studies demonstrated a slight improvement in LOS and both experienced reduction in 30-day readmission rates and ED visits (Huang & Liang, 2005, Jack et al., 2009).

In study (1) (Balaban et al., 2008) agree that patients were often ill prepared for transition to home, based on the hypothesis that nurses were often too busy to provide routine discharge care. In an attempt to assist the nurses to target key discharge priorities, the authors designed a RCT to compare the normal discharge process with the use of a "user-friendly" Discharge Form to guide the discharge process. The tool specifically addressed communication problems that occur frequently during transition such as dietary restrictions and medications lists. The study design also included a follow-up phone call. Four undesirable outcomes were measured. The results were encouraging with only 25% of the IG experiencing one or more undesirable outcomes compared to 55% in the CG concluding that a simple inexpensive "user-friendly" form could improve outcomes.

Three reviews concentrated on a specific population of elderly hip fracture patients (3, 6, and 7) and focused on comprehensive discharge planning interventions to reduce readmissions and ED visits. Two of the studies were implemented in the Republic of China (ROC) and the third was performed in Paris. These international studies corroborate the similarities in discharge process experiences and the need for enhanced strategies to reduce LOS and post discharge hospital utilization across continents. Both ROC hospitals conducted RCTs to determine the effectiveness of comprehensive discharge needs assessment, plan creation, discharge instruction, coordinated services and discharge placement. The Parisian study (6) was unique such that the intervention was the use of a trained geriatrician dedicated to targeting three risk factors to prevent readmission. These focused areas of risk included patient education, comprehensive medication review and detailed plans for the transition of care all consistent with US strategies (Legrain et al., 2011). Studies (3) and (6) measured readmissions, with (3) and (7) also measuring LOS and (7) also measuring quality of life (QOL) indicators post discharge. All

studies demonstrated consistent results in reducing ED visits and post-discharge utilization. Study (3) demonstrated slight improvement in LOS and study (7) demonstrated no difference in LOS between the IG and the CG. Study (7) did demonstrate self-care knowledge was significantly higher in the IG and the QOL outcome was better in the IG at the three-month mark (Huang & Liang, 2005, Legrain et al., 2011, Lin et al., 2009).

Two of the reviews were meta-analyses with study (5) focusing on synthesizing evidence found in RCTs on heart failure (HF) management programs and review (10) analyzing RCT evidence on discharge planning from hospital to home. The objective for study (5) was to examine whether nurse-led inpatient teams can reduce readmission rates for heart failure patients compared with a control group. The nineteen RCTs that were selected and reviewed included nurse-led pre-discharge care delivered by means of discharge planning or inpatient education and/or evaluation or consultation in addition to the usual care provided by the CG. Studies were also stratified by subgroups including follow-up and or telephone access. All studies in the (5) meta-analysis examined the variable of readmission. Statistically significant homogeneity was observed across studies due to variations in approaches among HF management programs. Subgroup analysis for home visit interventions showed statistically significant fewer readmissions for both all-cause and HF readmissions leading authors to conclude nurse-led discharge interventions may reduce readmission (Lambrinou et al., 2012).

The second meta-analysis (10) is a Cochrane review systematically analyzing the effectiveness of planning the discharge of patients moving from hospital to home. The selection criteria were limited to RCTs that compared an individualized discharge plan with routine discharge care that was tailored to the individual patient. Twenty-one RCTs were included in this review and the data indicated that a structured discharge plan tailored to the individual

patient probably brings about a small reduction in hospital LOS and readmission rates and an increase in patient satisfaction. The authors describe the reporting of different outcomes restricted the degree to which data could be pooled. However, data was pooled to demonstrate data from trials recruiting older patients with a medical condition and found a small significant reduction in LOS and readmission rates for those allocated to discharge planning (Shepperd et al., 2010).

Nosbusch et al. (2010) provides an integrated review synthesizing evidence from both qualitative and quantitative studies investigating practices, perceptions and experience of bedside nurses relative to hospital discharge planning. In study (8), thirty-eight published articles met inclusion criteria consistent with the aims to stimulate knowledge development around the bedside nurse role in hospital discharge planning. Seven themes were identified across the studies including communication, systems and structures, time, role confusion, care continuity, knowledge and invisibility of the nurse. Effective communication emerged as a prime issue that challenged bedside nurses throughout the discharge planning process. The authors suggested embracing working relationships and team-based approaches to improving communication. Secondarily there is preliminary evidence that suggests use of a critical pathway improves communication among nurses as well as between nurses and other disciplines. Lastly the authors posit the need for additional discharge planning redesign initiatives, which include rigorous evaluation of patient outcomes (Nosbusch, et al., 2010).

The final review (9) is specific to the high-utilizer psychiatric population in a multicenter trial in Germany. Medical patients with co-morbid psychiatric illness experience additional challenges to safe discharge transitions. The authors of this RCT tested the effects of a needs-oriented discharge planning intervention on number and duration of psychiatric impatient

treatment episodes, outpatient service utilized, depression and QOL. The authors hypothesize that insufficient discharge planning and follow-up can be considered an important reason for readmission and unfavorable outcomes. The participants in this study were allocated to the intervention group and received two NODPAM intervention sessions (pre-discharge and monitoring) with nurses using a structured discharge planning intervention for patients with severe mental illness. Participants allocated to the control group received treatment as usual. The authors reported no significant difference between the IG and the CG in use of a structured needs-oriented discharge planning program for patients with severe mental illness and a defined pattern of high utilization (Puschner et al., 2011).

The review of this evidence supports specific discharge planning strategies more than others. The use of a user-friendly discharge form to guide the discharge process was proven effective in a community hospital setting and could be generalizable to other academic and safety net facilities. The incorporation of home visits and discharge follow-up phone calls demonstrated a positive correlation with better outcomes in the intervention groups suggesting this is a solid strategy that proved successful both in the US and abroad. Finally, the use of a designated nurse discharge advocate or physician-led discharge conference was demonstrated to reduce emergency department visits and readmissions.

After reviewing the evidence, three practice changes are recommended. The first approach was to incorporate the development of a discharge nurse advocate role on each nursing unit to facilitate the coordination of discharge planning with a substantial emphasis focused on patients with high risk for readmission. The second strategy was to institute the discharge checklist as a care pathway to guide the bedside nurse toward safe and timely discharge. The final recommendation was to incorporate a post-discharge follow-up call system that would

confirm that patients fully understand the discharge instructions to increase the probability of a successful transition to home. These three evidence-based strategies support the overall aim to transition patients safely to post discharge care and reduce the risk of readmission.

Review of the Evidence - Handoffs

According to the Joint Commission (TJC), failures in handoff communication contribute to significant adverse events in healthcare. The Joint Commission further defines handoffs as contemporaneous, interactive processes for passing patient-specific information from one caregiver to another for the purpose of ensuring the continuity and safety of patient care. To heighten awareness of the risk associated with patient handoff, TJC included handover communication as one of the national patient safety goals in 2006 (TJC, 2007). Atul Gawande, author of the Checklist Manifesto, postulates that avoidable failures continue to plague healthcare because the volume and complexity of knowledge has exceeded our capacity as individuals to properly deliver information correctly, consistently and safely (Gawande, 2009). As healthcare becomes more complex, the complete transmission of patient care information between healthcare professionals becomes vital for safe transitions in care for many patients with chronic and co-morbid conditions.

As patients are preparing for discharge from an acute care hospital, numerous milestones must be met to ensure a safe transition to the next level of care. To ensure a safe and timely discharge, all members of the patients care team must be in alignment with barriers and goals. Ineffectiveness of handoffs can lead to progressive information degradation resulting in omissions and inaccuracies in the information shared (Arora et al. 2005). When breakdown in information occurs preceding discharge, delayed discharges can occur adding unavoidable

patient days and adding to the LOS. Gaps in handover communication guiding discharge planning were identified as problematic and required intervention.

The aim of this literature review is to synthesize and present previous research focused on proven strategies that improve handoffs by improving the quality of the information shared and the methods utilized to ensure standardization of the process. To formulate the questions to guide the search, the PICOT format was utilized:

P – hospital inpatients, pediatric and adult

I - tools to improve knowledge and information transfer during handoff

C – specific intervention

O – decreased error rate

T – during transition of care

Two key questions narrowed the search strategy: what are the known factors to enhance or hinder communication during handoff? What tested strategies facilitate a safe and effective handoff? Improving on known strategies for information transfer has broad implications for hospitals in meeting both patient safety goals as well as reducing unnecessary cost.

The literature review was initially undertaken using seven search terms to electronically scan CINAHL, Medline, PubMed, Cochrane, Ovid, NCBI, NLM, and Google Scholar databases focusing on studies published between 2007-2013. The following groups of key words and Medical Subject Headings (MeSH) were combined in various sequences using the Boolean terms "and" and "or" in the searches: (1) handoffs, (2) communication, (3) patient safety, (4) randomized controlled trial (RCT), (5) checklist, (6) technology, (7) and nursing. Reference lists and author searches were subsequently incorporated.

The electronic database search initially yielded 4,044 titles and abstracts. An advance search limited to years 2009-2013 with search terms reduced to (1) handoff, (2) communication, (3) patient safety, (4) and checklist honed the list to 82 articles. These were further screened for language, scholarly journals, duplication, and relevance to topic, year published, and quality of research. Opinion pieces, and personal case histories were also excluded leaving 14 manuscripts to be eligible for inclusion in this review. The fourteen publications included in this review demonstrated a majority of qualitative research including meta-synthesis of qualitative studies, literature reviews, quality improvement process initiatives and three quasi and non-experimental studies. Of note is the absence of RCT studies found in the search. Two RCT articles were found that did not have relevance to the topic and were excluded. Key considerations in the selection of these articles were the strength of evidence, relevance to the topic, and applicability to improve upon known strategies in handoff communication. The Johns Hopkins Nursing Evidence-based Practices rating scale is used to rate the strength and quality of the research (Dearholt & Dang, 2012).

All studies reviewed were published from 2010 – 2012 in an attempt to capture the most relevant and current information on a variety of communication handoff strategies. The articles were published in thirteen different journals. Four reviews were qualitative studies, one was a meta-synthesis of qualitative designed studies, four were literature reviews, two were non-experimental, one was quasi-experimental and two were process improvement initiatives. Nine studies were performed in American hospitals and five studies were conducted internationally (see Appendix D for evidence summary table/handoffs).

For the purpose of this review, all studies reflected the need for effective handoffs to ensure safe and effective patient care transitions. The primary themes in many of the articles

focused on systems that supported coordination of information flow as it related to the handoff process and concomitantly tools utilized to guide the handoff process. Authors (1), (5) (6), (7), (9), (12), (13) and (14) specifically discussed using a checklist as an intervention to guide the handoff process. Authors (3), (4), and (7), reviewed standardized processes and protocols for handoffs without the use of a tool, and three authors, (9), (12), (14) discussed integrating both checklists and process. Study (10) explored using a specific rating tool to determine handoff quality. The remaining authors (2), (8), and (11) synthesized current literature to identify themes that influence the quality of handoff information.

The authors of study (1), Abraham et al. compared the standard SOAP note method of communication during handoff to a newly designed "HAND-IT" checklist to evaluate the effectiveness of the new tool (Abraham et al., 2012). The Handoff Intervention Tool (HAND-IT) was based on a content-specific checklist inspired by the body system format giving organization to structured information. Based on a pre-post prospective study, when using the HAND-IT tool, the authors found fewer transition breakdowns, greater tool resilience and increased learning for inexperienced clinicians. In addition, HAND-IT by its very design, supported coordination of information flow and decision-making and helped to ensure continuity of care (Abraham et al., 2012).

The authors of study (5) in a longitudinal study compared three morning handoff protocols for medical interns consisting of written, electronic and face-to-face methods over three study phases. This study demonstrated that a scheduled face-to-face handoff process improved the communication of essential patient care information between cross-covering teams (Craig et al., 2012). The authors of study (6) reviewed 20 original studies concerning the use of the World Health Organization (WHO) surgical checklist on safety-related behavior in the

operating room. These results supported the WHO's recommendation to use the surgical checklist in all operative procedures as an instrument for improvement of communication, teamwork and to improve the culture of safety (Fudickar et al., 2012).

Halm (2013) in article (7) found that highly reliable handoffs incorporate three key elements: 1) face-to-face 2-way communication, 2) structured written forms, templates or checklists and 3) content that "captures attention". Halm reported that preventing communication failures begins with structured communication. The author continues by suggesting written tools introduce redundancy that helps the nurse organize large amounts of information to convey complex issues in a meaningful way (Halm, 2013).

Joy et al. (2011) used a prospective interventional study (9) to study handoffs from the operating room to the CICU comparing verbal handoffs with that of a checklist of key elements to guide the handoff process. The authors reported a significant reduction in technical errors and also information omissions with the use of a checklist guided handoff (Joy et al., 2011). Supporting the checklist concept, a team from the Veterans Health Administration implemented Medical Team Training (MTT) and Crew Resource Management (CRM) techniques taken from the aviation industry to enhance communication and reduce errors (Paull et al., 2010). The purpose for the study (12) was to understand the effects of a checklist-driven preoperative briefing on specific patient safety measures. The authors concluded the checklist-driven briefings were associated with improvements in patient safety metrics for surgical patients.

Petrovic et al. (2012) from Johns Hopkins Hospital (13) piloted a tool for patient transfers from the OR to the cardiac-surgical ICU as a process improvement initiative to improve patient transfers, which were associated with communication breakdown and low provider morale. The authors described a five-step process guided by checklists that improved communication and

information sharing during handoffs that also increased satisfaction of the receiving teams and decreased distractions (Petrovic et al., 2012). The author of article (14) developed a checklist to be used to develop situational awareness in the operating room to ensure the exchange of essential patient information (Wright, 2013). In this non-experimental exploratory study, Wright (2013) first examined current practice of 300 CRNA's and then developed, implemented and evaluated a communication checklist tool designed to improve situational awareness. The checklist incorporated mnemonic strategies to allow for easy retrieval of information. In evaluating the PATIENT checklist tool itself, 90% of the respondents believed the length and scope of the content were appropriate and that the tool lent itself to memory although the study failed to promote sustained change in the use of the tool (Wright, 2013).

Two studies (3) and (4) focused on contributing factors to communication breakdown during handoff. Chen et al. (2011) performed an observational, cross-sectional study (3) of handoff communication events occurring in the PCICU between the cardiothoracic surgery and anesthesiology team following cardiac surgery. The authors identified three factors that affected the quality of the handoffs: 1) reliability of attendance at observed handoffs, 2) reliability of content reported at observed handoff, and 3) number of distractions during communication for each handoff (Chen et al., 2011). The authors admit the study did not demonstrate overwhelming positive results but provided opportunity to address identified process deficiencies.

Clarke et al. (2012) utilized the philosophy and methodology of Appreciative Inquiry (AI) to investigate the process of patient transfers to determine what aspects were working well and should be incorporated into standard of practice. The purpose of this quality improvement (QI) process was to examine what goes right in handoffs and build on strength rather than failure

(Clarke et al., 2012). Through this process the nurses created the "dream" process, which included face-to-face handoffs, quiet place to prepare, standardized verbal report, and standardized checklist. Although the authors admit problems with sustainability in the interventions, the process of AI was deemed successful as a method to build trust among stakeholders (Clarke et al., 2012).

Three of the reviews consisted of meta-synthesis, integrative literature reviews and literature reviews. Study (2) explores the role of documents and documentation in communication failure among healthcare professionals across the perioperative pathway. Through review of 59 papers, the authors purport that any document deficient in detail, currency, accuracy, availability or its function can compromise information and coordination of patient care (Braaf et al., 2011). The objective for study (8) was to examine the qualitative evidence on dynamics of knowledge transfer during transitions in care. A systematic review was conducted on 29 qualitative studies representing more than 800 nursing handoffs. The authors report the evidence shows handoff to be complex, social interaction highly sensitive to context and cultural norms (Holly & Poletick, 2013). Holly and Poletick further identify two synthesized findings: 1) individual nurses influence patient care as the gatekeeper of information handed off that is used for subsequent care decisions, 2) there is an imbedded hierarchy in relation to the handing over of information that serves as a method of enculturation into the nursing unit.

Study (11) aims to critically examining the literature on methods and modes of delivery of handover used in healthcare settings to explore the feasibility of computerized handover system for improving patient safety. The authors reviewed 126 articles considering communication theory and factors impacting effective clinical decision-making. Matic, Davidson, & Salamonson, (2010) discussed the potential advantages of electronic tools including

standardization of data definitions, consistency of information communicated and minimization of ambiguities.

Study (10) aimed to develop and test a rating tool for the quality of patient handoff at care transitions that can be used in a variety of clinical settings for self-assessment by the clinicians involved in the handoff (Manser et al, 2010). Two analytical steps in this study investigated 1) the dimensionality and 2) the predictive validity of the rating tool for handoff quality. The rating tool identified three factors in predicting handoff quality: 1) information transfer, 2) shared understanding, and 3) working atmosphere (Manser et al., 2010).

The review of this evidence supports certain handoff strategies more than others. The use of a user-friendly checklist to guide the handoff process was proven effective in a perioperative, ICU, and VHA settings and could be generalizable to other academic and safety net facilities. The incorporation of standardized handover protocols and processes demonstrated a positive correlation with better outcomes in the checklist groups suggesting this is a solid strategy that proved successful. Finally, the evidence supports the continued use of a face-to face communication to add an extra layer of security to prevent poor exchanges of information during handoff (Chen et al., 2011).

After reviewing and analyzing the evidence, the following practice changes are recommended. The first approach was to develop and utilize a standardized checklist to incorporate all necessary components to guide the discharge process. The evidence solidly supports using checklists to ensure standardization of processes. The literature suggests checklists provide protection against failures by reminding us of the minimum necessary steps and make them explicit (Gawande, 2009). Gawande (2009) also believes checklists offer the possibility of verification and instill a kind of discipline of higher performance. Creating a

shared discharge checklist of key targets and milestones for coordinated use would instill the structure and transparency necessary to eliminate last minute complications on the day of discharge. Providing the care team with a checklist of milestones can prevent omissions in the process that may delay discharge.

The second evidence-based strategy is to utilize face-to-face communications to augment the checklist and standardized protocols. Maintaining daily in-person communications via standardized multidisciplinary rounds will allow for further discussion and clarification of patient specific care issues.

Relation to other Evidence

Communication around discharge needs is a dynamic process that requires data movement across stages and among service providers in real time. As such, the information must be documented and easily accessible daily as the patient progresses to discharge. According to Foust in a study performed assessing patients' post-hospitalization needs, the documentation of discharge planning is scarcely done daily and much was not documented until day of discharge (Foust, 2007). Foust's results support the need for daily interaction with the patient and these concepts were used to establish daily rounding patterns for the UDF's. Determining a patient's post-discharge needs should be a collaborative process with the physician. However, Foust found nurses indirectly learned about physician clinical assessments or plans through medical records or after rounds when talking with the patient. Actual conversations about discharge planning with physicians were rarely observed (Foust, 2007).

Maramba et al., support strong communication practices in discharge coordination (Maramba et al., 2004). Discharge care coordination is the process of identifying and preparing for the patient's anticipated health care needs at discharge (Maramba et al., 2004).

Interdisciplinary collaboration determines the patient's post-hospitalization needs and is a future-oriented process that begins with admission and ends when the patient is discharged. In addition, according to Morris, the longer patients are in the hospital, the more they are at risk for infection, pressure ulcers, and the deconditioning that occurs with extended stays (Morris, 2010). Maramba et al., and Morris agree strong communication practices are essential to prepare the patient for timely discharge. Discharging patients when they no longer meet inpatient criteria is good patient care and is in alignment with the Institute of Medicine (IOM) report on reducing hospital-acquired events (IOM, 2001).

Bauer et al., (2009) agreed that deficient documentation is one of the primary barriers to the patient discharge process. Oftentimes, the day of discharge is the last chance to identify unmet needs (Foust, 2007), which can result in discharge delays. The conclusions found in both articles supported the findings in the Medical Center gap analysis. Considerable care planning is performed in silos with little interactive communication among key team members and information can be difficult to find. The new workflows and discharge pathway would address issues identified by Bauer et al., and Foust, as tools to bridge the gaps in communication to improve discharge planning.

Knowledge is the content of communication (White & Griffith, 2010). Communication is an exchange of information between two or more participants. In most organizations workflows are facilitated by communication. Discharge planning is one such workflow and requires knowledge sharing in order to meet patient discharge objectives. In high performing organizations, the ability to provide knowledge components in ways that deliver to each associate everything they need to know, on time and without error improves strategic performance (White & Griffith, 2010). Observational research in operating room

communication showed that almost one-third of attempted communications among providers did not succeed in their aim, and that more than one-third of these communication failures had visible effects on the delivery of care (Dayton & Henriksen, 2007). Ghavami believes information technology can and must play an enabling role in facilitating "high-bandwidth" communication (Ghavami, 2008). High bandwidth communication results when technology yields a value-added exchange of knowledge and information (Ghavami, 2008). Understanding the importance of knowledge and knowledge exchange in creating an electronic communication tool is an important concept to ensure accurate receipt of the information.

The literature is limited specific to IT solutions related to care coordination, discharge planning and knowledge transfer. Borrowing from concepts in the manufacturing domain, the idea of a just-in-time (JIT) delivery model prompted exploration of the idea to leverage communication and improve staff efficiency. The JIT production is aimed to produce necessary quantities of key items at a critical point in time (Takahashi & Nakamura, 1998). Furthermore, in JIT production models, an order is released when the demand arrives at the stage from the succeeding stage and the parts necessary to process the order are supplied from the preceding stage (Takahashi & Nakamura, 1998). Orders are released using demand rather than forecasted information (Takahashi & Nakamura, 1998). Although the concept of providing discharge information on a JIT basis missed the target for a proactive approach to discharge coordination, the discussion spurred a deeper exploration of other methodologies.

The Toyota kanban system stimulated more thought due to its prospective approach using queuing principles (Krieg & Kuhn, 2008). Kanban is a form of visual communication (Krieg & Kuhn, 2008). According to Krieg and Kuhn, in the classic kanban system, the number of full containers that should be on stock determines the number of cards, or "kanbans," that circulate in

the system. Full containers must have a kanban attached, and when one is removed, the kanban signals the deficit. Active kanbans are collected in one place that is close to the person responsible for the operation. As a result, that person always has the information necessary to decide whether to continue the production (Krieg & Kuhn, 2008). This kanban process brought to mind possibilities of creating signals that trigger action and transparency to all involved in the discharge process. Although this improvement process involved knowledge transfer and not product, the concept added value to the discussion. Information from the Technology Work Group for the National Transitions of Care Coalition relayed that one of the primary benefits of using technology in health care is the ability to ensure that the right information is available at critical times during all stages of care for the patient, especially at times of transition (Binder et al. 2010).

While there are many articles addressing the discharge process, research addressing information technology (IT) solutions that specifically focus on care coordination and discharge planning are scant in the literature. Many current EMR designs focus on MD workflow at the expense of the other care team members. Creating a common pathway with a centralized task management list including functions of responsibility, timing, priority, and completion is an opportunity to simplify shared information and offers a method for standardization of care (Binder et al., 2010). Taking concepts from discharge planning experts, the IT world, and the business and lean sectors helped germinated what would become the technology solution for interactive, transparent discharge planning at the Medical Center.

Conceptual Framework

Given the advances in technology and information systems, requirements imposed by regulatory bodies, and changes in payment structures, the pace of change is growing

exponentially. Thriving organizations must manage change efforts effectively in order to achieve overall organizational objectives.

The concept of "change management" is commonly recognized business jargon referring to the importance of utilizing a thoughtful business approach to move organizational initiatives forward. In 1951, Kurt Lewin presented a three-step change model identifying barriers to change in the form of opposing forces known as "unfreezing-change-refreezing theory." As a social scientist he postulated that to successfully change behavior, prior knowledge must be rejected and replaced to break the existing paradigm (Lewin, 1951). Lewin's cornerstone model identified concepts of driving forces and restraining forces that needed to be understood and overcome in order to reach a new state of equilibrium (Lewin, 1951).

Driving forces are those most noted by a push in a direction that causes change to occur or to move away from the current situation. While driving forces can produce change by pushing individuals in the desired direction, push strategies are frequently met with resisting forces that can counter the driving forces. Resisting forces hamper the change process due to individuals pushing back in the opposite direction often out of fear of the unknown and discomfort of moving away from what is comfortable (Lewin, 1951).

Unfreezing the existing beliefs and status quo is the first phase in preparing the organization to accept that change is necessary. This essential step provides the purpose for the change as the required motivational link, necessary to reduce resistance and group conformity that frequently hamper change efforts. Following unfreezing, the next stage in Lewin's process is "change or movement" when individuals begin to transcend resistance and resolve their uncertainty and support the new organizational direction. To encourage successful adoption of the change at this stage, individuals must understand how the change will benefit them. This

phase takes communication, support and time to reach a consensus of the group. The final step, refreezing the new concepts, ensures integration of the new practices thereby creating a new equilibrium (Lewin, 1951). Imbedding new practices, policies and accountability structures help to create a sustainability plan to solidify the changes. Driving and restraining is necessary to guide effective movement through the stages.

Motivation theory is based on a model of needs-behavior-satisfaction (McClelland et al. 1989). This theory attempts to explain what needs or wants an individual or group has that will cause certain behaviors to satisfy those needs. McClelland's Human Motivation Theory (also known as the Learned Needs Theory) provides a model to help identify people's motivating drivers. Based on the individual's life experiences, culture, and upbringing, staff responds to different drivers. McClelland identifies three motivators that help to identify the dominant driving force to help the leader influence how to set goals and reward team members. The three motivators identified in his theory are achievement, affiliation and power (McClelland, 1985).

The achievement oriented individual has a strong need to set and accomplish challenging tasks. The person driven through affiliation seeks belonging and group acceptance. Finally, employees motivated by power gravitate to control and influence others. Leaders pursing change objectives must understand not only their own internal motivational drivers but also the drivers of those being sought to change in order to constructively influence group dynamics.

McClelland's theory of human motivation interrelates with Lewin's change management model in all phases but is particularly essential in the unfreezing phase. As with any change process, predicting how those affected may respond behaviorally based on their specific motivational drivers, allows the leader to design a strategy that addresses their needs to support the change effort. Lewin (1951) stated, "Motivation for change must be generated before change

can occur." Motivating at each level based on characteristics and traits will help to prepare staff for the impending change. It is essential to build trust in any change process. Including staff in the need for change by identifying motivational drivers allows for the trust and cooperation to develop. Identifying and including the informal staff leaders at key points can help bridge the gap between leaders and staff. Utilizing these theories assists the leader in recognizing potential problems and taking the opportunity to include staff where beneficial to the process.

Methods

Ethical Issues

The process for discharge planning the Medical Center had been iteratively revised and adjusted over many years with limited success. All facets of discharge planning were being documented in various medical and financial information systems. Due to the lack of interoperability between the systems, the process to obtain information became difficult and cumbersome to retrieve creating delays in discharge. The system required a new approach to revamp a notably broken system. A quality improvement (QI) process was selected as the methodology to pursue this intractable problem by determining what changes could be produced to achieve better outcomes. This QI process provided a framework to follow from identification of the challenges to successful completion of the effort (Tague, 2005). Since this was a QI project and not a research project human subjects review was not required.

The product of this evidence-based test of change was an electronic web-based tool that enabled the health care team to visualize pertinent patient information from any computer desktop in order to establish priorities and move the patients toward a safe and timely discharge. According to Grace, (2009) "…illness makes one vulnerable to one's healthcare needs, but in trying to address that vulnerability a person becomes vulnerable to those that have access to that

personal information." The Privacy Rule was added to the Health Insurance Portability and Accountability Act (HIPAA) in 2003 and at that time mandated patient confidentiality by law (Grace, 2009). The Privacy Rule specifically covers all individually identifiable information including written, oral or computerized (Grace, 2009). Mindful of this information, the QI team designing this electronic solution, elected to use a program of cryptic code to relay information to the health care team to safeguard patient privacy and also to ensure only those with approved access could interpret the information.

The design created a web-based portal requiring password entry. Only patient care team members with leadership approval had access to the portal after receiving permission from the system administrator. This security access restricted non-clinical staff or those not involved in direct patient care from entering the gateway.

The electronic whiteboards hosting the patient discharge pathways were displayed in nurses stations, physician workrooms and private offices, however onlookers could make an attempt to read the boards if so inclined. The unique code established to relay information was designed using a defined taxonomy of icons and graphics as an obscure language known only to those with access. In this way, private information was maintained confidential and yet easily interpretable to those providing care. The design of this tool was successful in achieving the purpose of maintaining patient confidentiality and privacy.

Setting

Discharge planning at the Medical Center followed a hub and spoke model. The hub of information and coordination occurred on each inpatient acute care unit where the patients are located and staffed with a Unit Discharge Facilitator (UDF) and Social Worker (SW). The UDF is a registered nurse, higher on the clinical ladder than a bedside nurse, who is responsible for

coordinating care with all multidisciplinary team members (i.e., nursing, social work, financial counseling, pharmacist, physicians, utilization managers, and rehab therapists) in order to establish a discharge plan and proactively mitigate any obstacles to discharge. The SW is an integral part of this team and works hand in glove with the UDF to manage challenging discharges. Each nursing unit is staffed with this team specifically hired into these roles and stationed on their specific units on a full time basis. The UDF's and SW's work eight-hour shifts Monday through Friday. Since the bedside nurses and charge nurses work 12-hour shifts, assigning designated UDF's, and SW's to the same unit everyday imbeds the day-to-day continuity. Part time UDF's and SW's are scheduled on the weekends to manage weekend discharges and a relief UDF works to provides vacation and sick time coverage ensuring seven day a week coverage (see Appendix E for hub and spoke model).

The spokes in this model reach out to the pharmacy, financial counseling, the physicians, rehab therapies and utilization management each of which provide essential elements in establishing the complete discharge plan but are located off of the nursing units. The UDF is the designated leader of this group and responsible for ensuring all milestones toward discharge are identified and addressed in the requisite timeframe. For this reason, all information must flow through the UDF in order for milestones to be met. Breakdown in communications with the UDF or a poor performing UDF have resulted in negative outcomes.

The routine on the nursing units is structured to facilitate information flow. At nine o'clock each morning the UDF and SW hold multidisciplinary discharge rounds (huddle rounds) with members of the care team in an attempt to capture the most up to date information on each patient. The unit census capacity is 30 patients and the time allocated for rounds is 30 minutes. The conversations are brief and are designed to focus on targets and milestones to discharge.

The intention was for each team member to discuss status of milestones and leave with clarity on individual and group priorities and subsequent tasks required to move the patient toward release. Barriers to discharge were also identified and discussed in huddle rounds in an attempt to design solutions to mitigate possible delays. Attendance at rounds remained inconsistent at times due to legitimate conflicting priorities leaving the UDF and social worker to bridge any gaps in information.

Prior to the current process improvement initiative, the UDF program had been reworked with involvement from all disciplines. Work processes were clarified and streamlined. A Gold Standard Discharge process was created and implemented (see Appendix F for gold standard discharge). Discipline specific roles were defined with clarification of duties and responsibilities to reduce role ambiguity (see Appendix G for role and responsibilities). These two tools provided a basic infrastructure for the discharge planning process.

One element most likely to positively influence this evidence-based change process is the history of involvement and integration of the UDF with the multidisciplinary team members from working on prior initiatives. There were tightly formed relationships within the team and each unit UDF was known and respected as the "go-to" person for discharge information. The team of UDF nurses had a history of participating in interdisciplinary workgroups on many workflow improvement projects. These team members knew each other well and historically had worked well together suggesting this project would proceed equally as well.

Planning the Intervention

The beginning of this technology-specific QI process was an extension of the successful work that had already been completed through previous collaborations with an active and involved multidisciplinary team. Armed with information from multiple RCA's, a two-day

retreat was held with representatives from all disciplines involved in the discharge process to create a process improvement charter. An advance practice nurse was appointed by the Chief Medical Officer to represent the medical staff due to time constraints with stakeholder physician groups. According to Tague (2005), it is essential to spend time and effort in-group discussions and in communication with the committee to make sure a good charter statement is agreed upon and understood by everyone. The retreat began with a recap of all work completed to date including review of the gold standard discharge process and the role and responsibility grid. A brainstorming session commenced identifying system weaknesses that result in communication breakdown and suboptimal handoff processes (see Appendix H for fishbone diagram).

A project charter was created out of the freethinking ideas generated during this focused two-day gathering. Discussion centered on goals, scope and desired outcomes and all were fully vetted and agreed upon by all stakeholders. The consigned goals involved creating communication pathways for each discipline that would relay patient needs and discharge obstacles from any workstation making the transfer of this information easy and seamless to the end-user. The fully supported strategy was to design an electronic discharge pathway that would promote interactive communication between the care team members. The scope of the project added functionality to existing systems to create a communication platform for discharge planning. This IT-based pathway would guide the discharge process in a similar fashion to checklists that guide pilots in completing safety protocols for takeoff and landing (Nance, 2008). The feasibility of transforming this concept into reality within the existing IT infrastructure was vetted and confirmed with the Information Technology Systems (ITS) lead architect. The project description defined the creation of a web-based application that would allow multiple roles to

collaborate together and synchronize their efforts toward discharging complex patients (see Appendix I for project charter).

Following development of the charter, a gap analysis was performed identifying both the attributes of discharge planning and information handoff procedures and then comparing future state to the current state. The current state summarized the lack of interoperability of communication systems, lack of process standardization and inability to locate important pieces of the patient's discharge picture. The vision of the future state improved the transparency of communication for both clinical targets for discharge as well as barriers to discharge in order to guide both the team and the patient toward milestone completion necessary for a timely discharge. The future state also envisioned one electronic location for discharge information to improve continuity from day to day (see Appendix J for gap analysis).

A working action plan was then drafted to provide direction to the team in visualizing the small pieces of the larger scope of work that was necessary to move toward the future state. Incremental steps included retraining the staff on the gold standard discharge to standardize work processes and creating a discharge flow algorithm. This document served as a catalyst to action items as specific task groups were formed (see Appendix K for discharge planning action plan and Appendix L for discharge flow algorithm).

The project sponsor brought forth a proposal to create an interactive web-based discharge checklist to the executive team for organizational support and approval. The charter and cost benefit projections were reviewed in both the Transformation of Care Committee (TOCC) and the Process Improvement Steering Committee (PISC) to garner full leadership support. The project sponsor was required to provide a full report on a quarterly basis to both the TOCC and

PISC chaired by the CEO to ensure the executive leadership team was fully informed of project status (see Appendix M for committee reporting structure).

This initiative touched many disciplines and therefore required participation in the work teams by multidisciplinary members. Gaining acceptance was essential for a successful project change and to achieve scheduled deliverables. The UDF manager, pharmacist, rehabilitation therapist, social worker, financial counselor, nursing, and identified physician as well as an IT specialist were included in both the project design and rollout strategy teams.

Buy-in from all disciplines was essential for this project to be designed properly and utilized effectively. Participation from the teams was crucial in creating a well-orchestrated project plan and timeline with agreed upon milestones to propel the project forward. Executive team approval was received prior to commencing on the project.

An initial project kickoff meeting was held to inform all nursing department leaders of the conclusions from the retreat and the subsequent proposal to design and implement a web-based electronic checklist. The Department Managers meeting was utilized as the prime forum for updating the compliment of organization-wide managers of this process improvement initiative focusing on improving patient handoffs in the discharge planning process.

The IT Design Committee (ITDC) was established to design the electronic tool and charged with addressing the issues identified in the gap analysis. The project sponsor and the UDF manager were the key-nursing representatives assigned to this committee to ensure conformance to the project charter and assist the IT architects with the traditional components of the discharge process. The primary IT members included the lead IT system architect, an IT analyst and the IT system administrator. This workgroup initially met weekly and moved to biweekly meetings as the design progressed. The work plan also included adding ad hoc

members as necessary to discuss service specific issues (e.g. social work and pharmacy) as the project team was honing in on service specific workflows. Two separate project teams (i.e. UDF Project Team, Multidisciplinary Project Team) provided feedback to the IT design committee. Each discipline was scheduled to meet with the ITDC to ensure functionality for each specific set of workflows as well as to gain acceptance with the tool as it was evolving.

A project communication plan was created as a framework for coordinating and tracking key issues and action items. The communication plan standardized the flow of information to different stakeholders to ensure strategic decisions and issues were identified and addressed in a timely manner to meet milestones and targets. The communication plan clearly identified the target audience for the communiqué, frequency of dissemination, the venue, responsible party and the methodology for transmission such as written report or email (see Appendix N for communication plan).

Funding/Cost Avoidance

Budgetary considerations and funding requirements for this project proved minimal for the following reasons. The primary cost to this project was in staff time expended designing the electronic pathway and for training. However due to the organizational structure, all project team productive hours (including IT staff, ancillary department staff and nursing staff), were allocated to administrative operating costs. The ITS department is considered a support department to the hospital and therefore the overall IT staffing cost is paid out of overhead dollars collected as a designated percentage of expense from each cost center. For example, each of the 250 cost centers are mandated to allocate seven percent expense to overhead costs as an expense to their budget. Overhead dollars provide for routine infrastructure costs such as utilities and building maintenance as well as to support non-revenue generating service centers to the organization.

The IT department is a service department funded through overhead dollars. Each IT project must be approved through a rigorous project intake process to ensure oversight of resources available to meet all project needs. The organizational imperative to reduce LOS and readmissions added priority status to the project request. The executive team approved allocation of these resources based on the overall benefit to the organization. All IT staff are salaried employees and as such this work was allocated to them as part of their normal work assignments. Other staff resources such as the UDF, pharmacists and social workers were assigned to work on the project in the course of their regular workday in addition to normal duties. All members approved to work on this project were paid out of their home departmental budgets and tasks considered to be other duties as assigned. Since all labor hours on this project were considered routine work, the hours and associated dollars were not carved out as an expense to the project.

The capital dollars were negligible for this project due the ability to use the existing IT architecture as a platform for the new functionality. The nominal capital dollars anticipated for this project were allocated to purchase nine iPads with related software for the UDF's to use when rounding on patients. The amount estimated to be charged to each nursing department budget totaled $1249 per nursing unit. However, these charges were never incurred. Due to organizational concerns to be discussed later, these items were never purchased (see Appendix O for budget assumptions).

The cost-benefit projections were based on reducing both length of stay and readmissions as both added unnecessary cost to the organization. An average estimate of potential cost savings was determined by the finance department using a formula based on the hospital cost structure for both additional unpaid hospital days and for patients readmitted within 30 days. A schedule of avoidable cost was built using an average dollar assigned in increments of $600 per

day for unpaid days. The $600 figure included direct costs such as nursing, dietary, housekeeping, diagnostics and medications. These expenses continued when patients stayed in the hospital and were covered by insurance plans as long as patients continued to meet inpatient criteria. The insurance companies denied the charges when patients no longer met inpatient criteria since there were not medical necessity requirements to remain in the hospital. These are considered unpaid days and the expenses incurred reduce the overall contribution margin. In addition, an occupied bed prohibits a new patient from being admitted. New patients add additional revenue from inpatient stays by filling an empty bed. However, since there were no guaranteed patients to add incremental new volumes, that revenue offset was not included in this cost benefit projection.

Reducing readmissions offered the second opportunity for cost avoidance. The finance department analyzed data on all readmissions for a six-month period to determine actual average cost per readmission and compared that to payments received. The direct expense to the bottom line was calculated to be $10,000 per readmission. Cost-avoidance projections were demonstrated in a spreadsheet of projected savings based on anticipated improvement. Reducing readmissions by five patients per month would determine a cost savings of $50,000. Similarly, a reduction in LOS by 30 patient/days per month would result in a reduction in cost of $18,000 per month. Realizing larger reductions in both LOS and readmissions would accelerate gains in cost avoidance. The cost-benefit projection schedule demonstrated the opportunity for cost savings by improving and enhancing the discharge planning process (see Appendix P for cost-benefit projection schedule).

Implementation of the Project

The design phase of the project commenced in July 2011 following sponsor and stakeholder approval. Under the direction of the project sponsor and project manager, the project scope, plan, resources, milestones and committee structure were put in order and the preparatory phase of the project began. The discharge team members (i.e. social workers, nurses, UDF's, providers, UM, pharmacy, therapies, FC) were interviewed as separate groups to ascertain department specific process gaps. Baseline metrics were gathered and reviewed. The allocated project time frame was established at eighteen months based on the completion of specific milestones. A Gantt project flow chart was created to illustrate milestones and monitor progress. Major milestones included the assessment phase, creating project teams, defining and scoping the project, concept development and creation of the training programs. A prototype was to be tested in December 2011 and modified based on feedback from end-users (see Appendix Q for Gantt chart).

Nursing department managers identified training as an essential component to a successfully implementing this new technology. The Gantt chart projected development of discipline-specific teaching modules in the first quarter of 2012. A training calendar was established and publicized in April of 2012. The launch of the UDF EWB was to be deployed to all nursing units between June and September 2012 with ongoing training for physicians to ensure full engagement and adoption by December 2012.

The work breakdown structure (WBS) provided the framework to ensure all components of work were identified to organize disparate aspects of the project. The initiation section (1.1) aligned steps to achieve approval of the charter submission. The planning section (1.2) established specific steps to create work teams to develop the project plan and timeline and

achieve signoff by the executive sponsor. The execution phase (1.3) outlined stages necessary to move the IT team to design the system, install, test and rollout the new technology. The oversight section (1.4) identified the need to create process and structure related to supervision of the overall project plan. Finally, the completion portion (1.5) provided elements of structure in the closing of the project through audits, surveys, metrics reviews and project for sign off (see Appendix R for work breakdown structure).

The project was rolled out methodically following a detailed rollout schedule. The discharge boards were rolled out one nursing unit at a time utilizing a full time educator to ensure complete understanding and functionality of the UDF electronic pathways also known as UDF electronic whiteboards (UDF EWB). Structured learning modules were designed and provided to all staff with the expectation they be completed prior to the rollout date. Standardized talking points were drafted and distributed to each manager to ensure the delivery of a consistent message to all staff about the purpose, benefits and role changes expected during this implementation process (see Appendix S for UDF EWB talking points). During the weeklong unit-based trainings the multidisciplinary team members stationed in those unit locations were trained concomitantly in both access and functionality (see Appendix T for UDF EWB training schedule).

Planning the Study of the Intervention

This project was initiated as a standard quality improvement (QI) process with the intention of reducing both LOS and readmissions. The process began with root cause analyses (RCA) performed on significant discharge delays to identify common themes. A current state analysis followed with the development of stakeholder led work teams, a project charter, gap analysis and future state design.

Multiple process gaps were identified during the assessment phase. The project team was enlisted to address the following core issues identified through RCA and gap analyses using a technology solution:

- *One location for information* – Inability to locate information due to disciplines documenting in separate and discrete computer systems that did not interface restricting the ability to share information.
- *Role and responsibility clarification for all team members* – Inability to determine who is responsible for a given task.
- *Transparency of information* – Inability to locate information due to non-interoperability of computer platforms and system complexity.
- *Real-time information* - The inability to communicate a change to the entire team without numerous phones calls.
- *Continuity of information* - The inability to relay day-to-day information when key team members are absent.
- *Two-way communication* - The inability to disseminate a quick alert if a barrier had surfaced to discharge.
- *Prioritize the priorities* – The inability to consolidate information and establish a group priority so each member could focus on the same discharge event.
- *Access from any workstation* – Inability to access information when off the nursing unit.

Due to the iterative process of IT construction, the Plan-Do-Study-Act (PDSA) cycle of continuous quality improvement was used to conduct small tests of change as the project progressed. This four-step model allowed for the testing of incremental changes with every step of this change process as the design reached maturation. Incorporating the learnings guided the

wider changes and improvements. The IT Design Committee (ITDC) met weekly. During these meetings the IT lead architect provided a demonstration of construction to date giving the stakeholders the ability to test the usability and functionality of the design. The stakeholders (i.e., UDF, pharmacist, providers, social worker, utilization manager, financial counselor, rehabilitation therapist) would analyze each component and weigh in on applicability, functionality and ease of use. The PDSA cycle was imbedded in the design process to provide the best probability of creating a user-friendly electronic discharge pathway (see Appendix U for PDSA cycle).

The interventional components of the design were based on stakeholder input and taken directly from the gap analysis. These elements were expected to improve communication and continuity. To mitigate the obstacles identified in the gap analysis, the following remedies were implanted to bring about the following desired changes:

- *One location for information* – The UDF EWB would become the go to source for current information about the patient discharge. All team members would receive computer access to enter the portal for this specific discharge-based pathway. Each team member would be trained on the use of the board and the interpretation of the icons.
- *Role and responsibility clarification for all team members* – The UDF EWB had built in workflows to identify role specific duties. Each would be identified with a specifically designated icon. This would reduce role confusion and establish responsibility for each duty.
- *Transparency of information* – The unique design of the UDF EWB provided for an "airport" view (similar to departure and arrival boards at the local airport) of each patient on the ward. All team members could view any patient's pathway and determine at-a-

glance what needed to be done to move the patient toward discharge eliminating the need to mine through various data repositories.

- *Real-time information* – The design of the UDF EWB would allow the entire team to view the updated patient pathway and see changes as they occur.
- *Continuity of information* – The UDF EWB would be the central repository for all information and not dependent on team member presence. In the event of absenteeism, the tool would provide the most up to date information and was not dependent on the missing worker.
- *Two-way communication* – The UDF EWB would allow for information sharing.
- *Prioritize the priorities* –The UDF EWB would have the ability to sort by date and time in order to direct the team to the most urgent priorities.
- *Access from any workstation*- The UDF EWB was designed as a web-based tool that could be accessed by any team member from anywhere in the hospital.

Training in both use and functionality of the EWB program as well as standardization of workflows were essential factors in maximizing internal and external validity. Standardized training and consistency in using the tool were essential in order to achieve positive results. Failure to sustain both use and standardization would pose threats to anticipated outcomes. To ensure standardization of the education program, a sole educator was used as a part of the rollout strategy to eliminate different nuances between instructors. The selected educator was a registered nurse and known stakeholder in the design process and also highly regarded as an expert user of this technology. This individual was integral in the design of the training tools, the rollout schedule and the talking points. This clinical educator had a history of successful deployments with other initiatives and had a positive reputation for clinical competence.

The UDF nurses were the natural workgroup connected to the daily operations under review. They were the identified discharge planners on each nursing unit and understood both the complexities involved in discharging patients with placement challenges and also the difficulties in locating information that impacted timely discharge. These nurses had been involved in all prior improvement endeavors and fully understood the granular level of the work. Although the UDF's had been intricately involved with prior PI work, there was a demonstrated lack of sustainability or follow through in many of the preceding endeavors. The reasons for prior initiative failure stemmed from poor leadership and lack of accountability. The archives of unsustained initiatives illustrated the need for leadership and accountability in efforts to sustain the new workflows with use of the electronic communication board. To imbed the practices and instill safeguards to successful adoption, the UDF manager designed teaching tools, workflow expectations, and tied performance evaluations to sustainability of process changes.

The effectiveness of the UDF EWB tool was to be measured by assessing process and quality measures identified in the AIM statement. In addition, success in achieving the above operational outcomes was to be determined by staff survey on EWB functionality and by continued study of discharge related issues. ITDC meetings would be continued as a forum to discuss operational challenges with the design and functionality.

Methods of Evaluation

The goals of using technology to create a communication infrastructure for discharge planning and care coordination were to reduce fragmentation, loss of information, and discharge delays. A SWOT analysis was used in performing a risk assessment to determine the feasibility of creating and implementing a successful discharge planning application. The opportunities to improve team communication were abundant by directing care members to one portal for

information and planning. Creating a product that automated continuity of information flow was promising to help team members plan for and achieve timely discharge (see Table 1.0 for SWOT analysis).

Table 1.0 SWOT Analysis

Strengths	Weaknesses
• Strong IT Department • IT Infrastructure • Interdisciplinary team • Gold standard discharge in place	• Buy-in to use one more technology tool • Wireless bandwidth limited due to CPOE rollout • Multidisciplinary members must open tool daily
Opportunities	**Threats**
• Enhance team communication • Add ability to priorities team work • Add continuity form day to day	• Adoption • IT system down time • Rollouts must be sequential causing two different systems until fully deployed • Staff proficiency

There were numerous organizational strengths that supported pursuing the project goals. First, and foremost the IT department was equipped with a highly expert staff that was committed and enthusiastic about this project. The skill and ability of these talented individuals reinforced the likelihood of creating a successful design in both concept and functionality. The ability to use existing technology in the design to minimize capital cost was another major strength. This eliminated the need to request funds from the executive finance committee to sponsor this project. Strong relationships among the multidisciplinary team members created a collaborative foundation to start the process. Lastly, much work had already been completed with the prior implementation of the gold standard discharge process. This provided specific direction to the IT design team in order to imbed legitimacy of the discharge planning process and workflows into the tool.

A significant threat in adding any new IT program is the willingness of the staff to use the device, making adoption the main area of vulnerability. Of major concern was the climate on the nursing units at the time of the rollout. There were staff layoffs occurring and significant union activity. Because there was open resistance to change the decision was made to rollout the program sequentially unit by unit rather than all at once. This time delay would knowingly limit functionality across the organization. Full operability would not be realized until the system was fully deployed across all areas and all team specialties. A major concern was that some users might lose enthusiasm for the product before the results would be fully realized given that it would take a few months to rollout completely. Losing interest early could result in an inability to maximize full benefit of the technology. Demonstrating the benefits of the technology in reducing their individual workload while enhancing the quality of discharge preparation was a key component to overcoming this risk.

Quality and process measures were selected to determine the success of this intervention. The Quality Dashboard (QDB) is an electronic dashboard and the sole organization-wide repository for overall quantitative quality and process metrics. All reports are structured in like fashion under the standard four pillars of service, quality, finance and patient satisfaction. The data is collected on a monthly basis and transferred from the electronic medical record (EMR) or Admission/ Discharge/Transfer/ Registration (ADT/REG) system and stored in a central data repository. The Chief Medical Officer sets direction for organizational quality improvement in consort with two PhD-prepared statisticians who created the queries and designed reports generated from the database. The QDB displays hundreds of ongoing trend reports that guide process change for the Medical Center.

The metrics selected for this project aligned with the organizational goals to reduce length of stay and readmissions. The Decision Support and Quality Improvement departments provided the data for this project and accessed the central data repository to provide data for the project reports. The data was posted on the organization-wide QDB and updated monthly.

The data measured included acute care LOS, discharges by noon, readmission rates and patient satisfaction with the discharge process. The LOS is used to measure the duration of a single episode of inpatient hospitalization. The average LOS (ALOS) is used to measure a population, time frame or facility average. There are two calculations that are used to capture the ALOS with one being the patient days divided by the total admissions which is the calculation used for financial reporting of LOS. The benefit to this calculation is that it does control for high LOS variations. The second calculation, and the one used for this project, is that patient days are divided by total discharges. This calculation is the industry standard classically used for benchmarking purposes. The drawback to this calculation is that it does not control for LOS variations. The latter was chosen by the finance department as the organizational choice for trending ALOS due to the ability to benchmark these data.

Discharges by noon are retrospectively pulled numbers from the ADT/REG system. Each patient has a designated discharge time that is placed in ADT/REG and a data query pulls that number to determine how many patients were discharged out of his or her room by noon. Increasing the volume of patient discharges by noon was selected as an important deliverable for the organization to improve the patient flow from the emergency department (ED) and expedite morning elective admissions.

The 30-day all-cause readmission rate was also selected as a metric that may be affected with improved discharge planning and team communication. This metric was already captured

monthly in preparation for estimating penalty dollars associated with the value-based purchasing scorecard. Information discovered in the preliminary project work led the team to believe there were opportunities to reduce readmissions further with early identification of and improved planning for patient post-hospitalization needs. This metric is an easily captured data point also pulled retrospectively with a simple data query to the ADT/REG system.

The final quality measure focused on patient satisfaction with the discharge process. The question quantifies the percentage of time the patient was asked about help at home and provided written information about symptoms or health problems that might occur. This question is part of a composite set of questions asked about the patient's inpatient stay from an HCAHPS survey mailed to the patient 30 days after discharge.

As a part of this improvement process, a specific UDF folder was created on the QDB to display all measures associated with this PI initiative. The QDB as a web-based program offers the ability to review the UDF dashboard for real-time presentations to both the TOCC and PI steering committee. In this way the executive team and project sponsor can review and share ongoing information demonstrating the status of the program at any time.

Analysis

The executive team in collaboration with the project sponsors approved the measures to be monitored and established target figures based on organizational objectives. Setting the LOS goal proved challenging. Between the years 2010-2011 the LOS numbers were consistently reported at >7.0 days triggering the executive level concern that prompted the PI initiative. By the time the project baseline data was collected in August of 2012, the LOS had dropped precipitously to a LOS of 5.9 days for the month of August. There were many reasons discussed that could have impacted this number including changes in the number of extreme outlier

patients transferred or expired. A target figure was selected that was higher than the discrete August data point. The executives and project sponsor made that decision believing the August data to be anomalous and unsustainable. Therefore the decision was made to use 6.4 days as a reasonably achievable target and to use a six-month average for the baseline comparison instead of the discrete August data point. Determining targets for the remaining three measures was more straightforward based on more consistent trend data (see Appendix V for quality and process measures).

The project team met with the QI statisticians to clarify the intent of the data needed to ensure the data pulled would reflect outcomes related to the targeted process changes. The discrete measures to be captured and compiled into reports were fairly straightforward as discussed earlier. Following the initial meeting the reports were drafted as well as the query linkages for metrics collection. Trial runs on data assemblage were iteratively attempted to achieve collective satisfaction on data quality. An electronic interface was utilized to link the data to the quality dashboard. The UDF dashboard consisted of the pillars, targets, tactics and metrics. The team elected to use both discrete August and six-month average data as the baseline data for future comparison (see Table 2.0 for baseline data).

Table 2.0 Quality Dashboard – UDF Dashboard Baseline August 2012

Pillar	*Tactic*	*Target*	*August 2012*	*6-mo.avg 2012*	*June 2013*	*6-mo.avg 2013*
Service	Discharge by Noon	15%	12.40%	12.3%	-	-
Quality	Reducing Readmissions	<10%	9.40%	9.70%	-	-
Finance	Reduce LOS	6.4 Days	5.9 Days	6.22 Days	-	-
	Patient					

Patient Satisfaction	Prepared for Discharge	90.0%	88.0%	87.8%	-	-

The functionality of the QDB correspondingly allowed users to drill down under each metric to reveal service-specific and nursing unit-specific data to allow for further analysis and targeted improvement. All measures were analyzed for both unit and service trends. The overall project evaluation included six-month of data collection following full adoption of the electronic tool and workflows on all acute care nursing units. Post implementation data was captured from January through June of 2013.

In addition to the process and quality metrics, a UDF staff satisfaction survey was used to determine the level of satisfaction with overall functionality of the UDF EWB tool. This qualitative method of analysis was limited to a survey tool using a five-point Likert scale directed to the UDF's to assess the functionality of different components of the EWB. The tool used was not tested for validity and reliability but rather used to obtain information as part of the PDSA improvement process. The intention was to ascertain what functionality was of greatest benefit to enhance communication and efficiency and where to focus for future improvements.

Results

Program Evaluation/Outcomes

According to the Medical Center census data, the acute care nursing units ran100 percent occupied 95 percent of the time. There was a constant push to improve throughput in order to transition patients from the emergency department and the operating room to the inpatient wards. Inabilities to communicate the discharge plan of care to the patient care team created roadblocks that impeded discharge and patient flow for reasons already stated. The evolution of the initial

plan was to build on process improvement measures already implemented by adding a new method of communicating the discharge plan to all members of the team.

The first phase of the plan was to design the new instrument. An interactive web-based communication tool was designed that used two existing technologies already in place at the Medical Center for hospital registration and patient tracking. The electronic whiteboard (EWB) program in the operating room tracked and displayed the patient's location from registration through arrival to the nursing unit. This technology had been in use for two years and relayed information passively to users seeking status updates on patients receiving surgery. For example, a nurse on the orthopedic unit could access this program through a web portal and determine if his/her patient remained in the operating room or recovery room and the duration of time remaining before transfer. This provided the bedside nurse with more information with which to plan shift activities.

The second interface connected the existing ADT/REG program to the EWB system. The ADT/REG software supported many hospital systems including the EMR system, as it served as the main portal for entry of all patient financial information. The ADT/REG system was used to provide the connection to the EWB by automatically feeding all patient registration information to the electronic white board in real time.

Because there was already an existing interface between these two programs, a new discharge planning tracking program was feasible. As a part of the design, every new patient admitted to the hospital was automatically displayed on the UDF EWB screen immediately upon registration. Due to the capability of the existing technology the UDF EWB was designed without additional dollars to the capital budget.

Within the existing technology, the IT architects were able to design a web-based pathway to coordinate discharge planning using a standardized taxonomy of color-coded icons to identify specific and discrete milestones and clinical targets for discharge. The strategy was to use these icons to build a specific electronic discharge checklist based on each patient's individual needs. This patient pathway was easily accessible from any workstation and displayed all pertinent discharge information at-a-glance in a summary view. "At-a-glance" became the vernacular used to describe the convenience of viewing the real-time status of the patient's entire road map to discharge in one location.

The second phase of the plan was to educate the unit-based teams using a structured rollout strategy. Training materials were thoughtfully prepared to reinforce a standardized process. Due to a history of unsustainable practices that resulted in process breakdown, a master training plan was believed to be essential to the success of this project rollout.

Many positive changes in the discharge planning process did occur. With the old process, the UDF rarely interacted with the patient until the day of discharge. In the new paradigm, discharge planning shifted to an interactive process with the patient where the UDF rounded with the patient immediately upon admission and then daily thereafter. This allowed for a relationship to develop and a deeper understanding of what support the patient needed for a safe discharge. This also allowed for earlier identification of barriers to discharge allowing enough time to mitigate the issues before the discharge date.

Within the context of the new procedures, the UDF was expected to begin the discharge process on admission by performing a standardized discharge-focused assessment on each patient and then entering that information into the UDF EWB. Milestones to discharge were identified during the face-to-face visits based on each patient's individual needs. The UDF would

document specific care needs by using designated icons to identify requirements that must be met prior to discharge (e.g., home services scheduled, IV to PO medications, SNF placement). These patient specific icons illustrated the road map to discharge for each patient. Daily huddle rounds with the care team also helped to identify other remaining issues and the UDF would place those icons onto the UDF EWB as well. Between the daily UDF patient rounding and the team huddle rounds, the number of last minute issues that routinely delayed discharge diminished.

There was an inherent inability to transmit information from one day to the next in the old process. The UDF was the keeper of the information and would leave follow-up paper-based notes for the UDF scheduled for the next shift. The notes were frequently abbreviated and missing a depth of detail often necessary for complex discharges. For many reasons the old UDF handoff process from one day to the next resulted in last minute issues arising that delayed discharge. Other factors contributing to the communication breakdown in the old process included the UDF's prior schedule of working ten-hour shifts, the number of part-time workers and a heavy absenteeism rate. The new process created a process that would relay a complete and thorough account of next steps in the patient's discharge regardless of staffing continuity.

Within the new framework all information was electronically stored and displayed on the UDF EWB and patient information was communicated via a legend of icons that were considered 'to-dos' for each discipline. These symbols were identified in the legend and color-coded according to status: green meaning "complete," yellow meaning "in progress" and red meaning "incomplete" (see Appendix W for standardized UDF EWB icons).

The design of the UDF EWB incorporated structure within the architecture to clarify roles and provide direction. The physician, social worker, pharmacist, rehab therapist, financial

counselor and utilization manager were each given discrete columns to clarify their discipline specific responsibilities. In addition a section identifying the clinical targets for discharge was delineated to specify the requisite clinical targets that must be met prior to discharge (e.g. WBC normal). As the targets and to-dos changed from red to green status, the team observed the patients preparedness for discharge emerge and any barriers highlighted in red remained issues to be actively pursued for completion. This passive notification was intended to mobilize the team to focus on outstanding issues.

Other key features that were designed to assist the providers and team members prioritize their work included a priority sort feature and a "notes" function similar to that of a paper Post-It™ note to add details about urgent issues. These mechanisms allowed each discipline to sort their work by date and time of discharge in order to identify the highest priority issues (see Appendix X for UDF EWB screen shot).

There were many benefits that resulted from this improvement initiative. Of prime importance was the inclusion of the patient in every step of the discharge process. Patient frustration subsided because the technology and the ability to handoff information clearly eliminated the need to ask redundant questions. This process kept the patient informed of progress toward discharge and eliminated surprises on the day of discharge. The patient's improvement in satisfaction with discharge information was demonstrated in the HCAHPS survey process.

Other patient care benefits arose out of this PI process as well including the ability to identify and address clinical issues earlier on in the patient stay. The outstanding icons on the UDF EWB called attention to routine care needs such as discontinuing a Foley catheter which

evidence supports in reducing nosocomial infections and yet may have gone overlooked in the business of everyday work.

Other expected gains involved timesaving and elimination of redundant work. One of the incentives for physicians was to reduce unnecessary phone calls. Since the pathway was now viewable by all team members, it was clear what milestones were and were not completed. When providers rounded on the nursing units, they would speak with the UDF or if the UDF was unavailable could now view the UDF EWB and identify exactly what was required. This eliminated multiple phone calls, pages and the like.

This new intervention also added an ability to sort priorities within priorities in the event one patient's case took precedent over another. This functionality allowed the distinct discipline to sort by priority date and time. For example, a pharmacist located downstairs in the discharge pharmacy was able to sort by priority in order to visualize which patient discharge was the most urgent or time sensitive. The new functionality eliminated the need to handoff information to a relief pharmacist who might be covering for lunch relief and unaware of an urgent situation. This mode of communication provided transparent communication of specific patient information to help all caregivers meet the appropriate patient priorities.

Alternative strategies that were considered prior to embarking on this initiative included creating a separate discharge pathway in the EMR or creating a specific paper checklist placed in the hard chart for the team to use. While there are benefits to a paper checklist, this choice was eliminated early on as an option as it did not meet one of the major goals of the charter, which was to be able to view the information from any workstation. The team believed a paper form could get misplaced and required each team member to stop by the nursing unit to access the

information. To move the discharge process to a new level, the team supported a technology solution.

The team's first choice was to create a specific discharge planning flow sheet within the existing EMR system as the EMR was presently being used for nurse and provider documentation. A meeting was held with the clinical documentation analysts to discuss the feasibility of creating a tool to help manage the discharge process. An attempt was made to create a UDF note to help locate discharge information. However, due to the system architecture requirements, the UDF note proved to be limited and ineffective in providing ongoing up-to-date information. Another meeting was held to look at other electronic options within the EMR but, due to other competing priorities within the Clinical Information System (CIS) department, the CIS leadership declined the request to pursue a design. This decision then led to the discussions with ITS and other possible options within the existing IT infrastructure.

The change process did introduce several burdens for the staff and providers. With the improvement of information flow, the process was streamlined and fewer FTE were required. Prior to the change the UDFs worked 10 hours per day, two hours of which were required to sort through the medical record to complete handoff documentation. Following the change, the need to sort through documentation was eliminated and the UDF staffing model was changed to eight-hour shifts. While this change enhanced daily continuity, this change in hours created a burden for some UDFs. The UDF's schedule changed from a start time of 6 a.m. to 8 a.m. With this change in hours, a few UDF's felt that they lost the opportunity to speak with the surgeons who started in the operating room at 7:30 a.m. The modification in process resulted in workflow changes that placed responsibility on the night shift charge nurse for obtaining information from the surgeons. Since the UDF EWB was available to all nurses including the charge nurse, the

charge nurse was then responsible for passing this information on to the day shift charge nurse who attended huddle rounds with the UDF. While the continuity of information flow was improved the burden for some staff was now in being required to work five 8-hour shifts.

Another challenge that impacted this process change was an unanticipated problem with the IT security time-out of the computer system necessitating a repeated login after 15 minutes. This safety feature is intended to eliminate a third party accessing the medical record under another individuals login. This became an issue for providers and pharmacists who did not work on the EWB for long periods but rather in brief spurts and resulted in frequent time-outs and subsequent logins. The pharmacists found great value in the ability to prioritize discharge medications based on the priority discharge column. Significant attempts were made to eliminate the 15-minute security time-out on the display board in the pharmacy by delaying the time out to 30-minutes, and also attempting a badge-in shortcut that would eliminate the login process. The system-wide IT oversight committee could not identify or provide a viable, long-term solution that met organizational security requirements. Ultimately physicians and pharmacists found the process of repeated logins too onerous to continue with the program. The physicians elected to only use the airport view of UDF EWB on the nursing units, which although still providing information, limited two-way communication functionality. A resolution has not been found to date and the pharmacy airport display of the prioritized UDF EWB in the pharmacy remains inactive.

Discussion

Summary/Key Findings

The UDF EWB project was significant for many reasons including the need to facilitate appropriate bed utilization, provide effective throughput, and increase access for elective populations. In order for the Medical Center to meet financial and LOS targets, the point in time when a patient meets discharge criteria must correspond with the procurement of, and discharge to, a safe post-hospitalization setting. Achieving this goal can only occur with effective, streamlined communication. The prospect of using technology to improve communication within the discharge team in order to facilitate timely discharge, reduce LOS and reduce readmissions was consistent with the organizational goals to improve quality, safety and improve the financial margin.

This process innovation was developed from evidenced-based recommendations for both discharge planning and handoffs. The first tactic was to incorporate a discharge nurse advocate role on each nursing unit to facilitate the coordination of discharge planning with a substantial emphasis focused on patients with high risk for readmission. This evidence-based strategy was consistent with the existing UDF program and utilized the UDF as the champion for coordinating discharge care. The UDF is the unit-based advocate for ensuring all milestones to discharge are met for each patient. The second method was to institute the discharge checklist as a care pathway to guide the bedside nurse toward safe and timely discharge. This electronic version of a discharge checklist served this function protecting against failures by reminding the patient care team of the necessary steps by making them explicit.

There were many successes with this project beginning with the creation of a new modality for communication. The product was revolutionary. The functionality was consistent

with the anticipated design goals and was created incurring minimal capital expense. The process of identifying the barriers to communication with the care team and the subsequent collaborative efforts to design a solution provided hope to a frustrated interdisciplinary team. In the past, each discipline worked in a silo to solve their internal communication issues. This process tightened relationships and formed a solid coalition to solve this problem. With this integrated approach teams were brought together in creating a multifactorial approach to solving an organizational issue.

The PI initiative also formalized the discharge process and established consistency with roles and responsibilities for different tasks and processes, which reduced frustration within the team. By formalizing the process it allowed for standards and accountability. This paved the way for orientation and training materials for new employees and a general improvement in transition to post-hospitalization care. This initiative also improved the quality of the UDF handoff process while eliminating redundant, time consuming work. The reduction in work decreased in the FTE load by 2.0 FTE with associated cost reduction to the UDF program by $200,000 dollars (see Appendix P for program assumptions).

As a result of the improved efficiency of the UDF program and improvement in patient satisfaction with the discharge process the UDF program was wholly funded through fiscal year 2014. This will allow more time for the process changes to become fully imbedded and to determine longitudinal improvement over time. Posting the metrics openly has increased the dialog and awareness concerning causes and effects of the outcome data. This framework created a platform for continued discussion with the staff at all levels to improve the patient's overall experience with discharge planning as well as improving operational efficiency.

Lessons Learned

Identifying a specific intervention to change the process for discharge planning, along with a strategic training and rollout schedule was pivotal in transitioning to use of technology to help with discharge planning handoffs. Organizational and executive team support and leadership was essential in the overall success of this project. Using evidence as a basis to start process design provided credibility to the project and increased enthusiasm among department managers. Creating a process of teams to design and operationalize the tool increased buy-in and overall functionality and usability.

Although the overall project was successful on many levels, there were many lessons learned from this experience that would alter future work. Timing of the proposed change must always be considered in rolling out a proposed change in practice. This conversion unfortunately coincided with union activity and staff layoffs resulting in a milieu of uncooperativeness. Projects of this nature should be implemented in the spirit of joint cooperation and following a shared vision. The timing was poor and the decision was made to proceed anyway given the urgency of the operational implications. Postponing and gaining alignment may have changed the climate during the rollout phase and subsequent acceptance of the process changes.

Including expert staff nurses in the early discussions is essential when considering a change of any magnitude. Because of the overt staff discontent, many discussions were held regarding the best way to proceed without including the experts. Attempts to include the staff deteriorated into hostile dialog. The decision was ultimately made by the leadership team to proceed without staff level involvement in the design phase, which then fueled resistance to the workflow changes. While driving forces can produce change by pushing individuals in the desired direction, push strategies are frequently met with resisting forces that can counter the

driving forces (Lewin, 1951). Lewin purports resisting forces hamper the change process due to individuals pushing back in the opposite direction often out of fear of the unknown. Overcoming the resistance during the rollout became the struggle instead of imbedding the newly designed workflows.

Given the challenges with staff resistance, leadership decided the best option for gaining compliance with the new standardized process change was to provide constant direction and observation for seven days. The assumption was that this weeklong training format would instill clarity on procedures and reduce deviation from standards as well as establish expectations for performance. However, rolling out education and process changes to the nursing units sequentially extended the entire process to eight weeks. As a result, the length of time for full deployment caused confusion among many team members that were not live on the new system. As identified in the SWOT analysis, this strategy proved to hamper adoption of the product. In hindsight, training more trainers and rolling out in a big-bang fashion, may have eliminated some of the identified frustration. Many disciplines were primed and ready for the new technology. There had been much communication and the change was highly anticipated. The slow rollout approach left other staff confused and disillusioned with the program by the time the program rolled out in their area.

Another tangential logistical problem with the rollout strategy was that the educator could not be in two places at once when providing deployment training on one unit and being available to units that had already rolled out. The length of time for the instructor to circle back for sustainability observations gave ample time for the staff to deviate from standards. In retrospect, a wide-scale deployment may have allowed for more frequent guidance for ongoing maintenance.

Based on the information from both Lewin and McClelland theories of change management, this author would have made changes to this implementation plan. Following McClelland's theory, taking into consideration the needs and motivating drivers of the UDF group may have gone far in gaining cooperation. Taking time to identify incentives for key individuals or informal leaders may have led to a more effective implementation with less staff upset. The UDF group had a strong sense of affiliation with one another. Selecting one individual to represent the group may have conveyed enough good will to gain buy-in to support the necessary changes.

Lewin suggested that motivation for change must be generated before a change can occur (Lewin, 1951). During this project development, the author is uncertain if the motivation or the why for change, although discussed many times, was ever fully received and appreciated due to the generalized staff discontent. Following Lewin's model, ensuring the staff fully understood the why for change would be crucial to the unfreezing of old behaviors. Moving to an electronic system required use of change management theory to unfreeze current behavior, change and then refreeze to move successfully to the new methods. McClellands motivation needs theory was also important to consider in managing the change effort by taking time to identify the individual drivers for those involved and those that had the power to halt or delay progress of this effort. These two frameworks blended throughout all stages of the PI process. Considering the use of motivational needs theory and identifying drivers for key individuals, this author may have implemented the workflow changes more effectively.

Barrier to Implementation/Limitations

Project champions are essential to the success of any major endeavor. Champions are those that proceed with passion and tenacity battling the obstacles that attempt to impede

progress. One significant leadership change occurred immediately after the rollout and during the data collection phase of the UDF EWB project. The project sponsor, who is the author of this paper, took a position in another hospital and no longer had standing with this project. The project sponsor role was not replaced leaving the UDF manager to drive the project but without the level of support from the executive team since the project had been rolled out. As a result, when issues arose there was little administrative support to remedy the problems. For example when the security time-out issues impeded functionality with the pharmacy screens, little support was found to champion a solution. Although a leadership handoff occurred prior to the position change, the new leader was not invested in the project due to shifting priorities. After initiation of a project, strong and ongoing leadership is required to support ongoing challenges and to prevent enthusiasm from weakening.

Sustainability of the project was designed into the program built on manager supervision, ongoing RCA and data review. This was predicated on the ability of the manger to follow through with these tactics. After the rollout, the UDF manager was notified the relief UDF position would be eliminated effective July 1, 2013. This resulted in the UDF manager providing vacation and sick leave coverage severely reducing the time available for monitoring and support activities during the sustainability phase. It is too early to determine the effects of the reduced supervision time on the overall program outcomes.

Interpretation/Evaluation

Following six months usage of the new UDF EWB and the structured workflows, the data demonstrated improvement in two key areas. The volume of patients discharged by noon was selected as an important deliverable for the organization in demonstrating improvement in the patient flow for both the elective population and for ED patients waiting for inpatient ward

beds. As a high-occupancy organization, having patient's prepared and ready for discharge early in the day reduced delays in transfers and admissions thereby enhancing throughput. Boarding patients in the ED and having patients wait in the admitting area posed safety risks and affected patient satisfaction. During the assessment phase straightforward remedies were identified that could help expedite early morning discharges if addressed ahead of time. Following the rollout, solutions such as scheduling a pick-up time for the patient or having the medications filled the day before, were now placed on the UDF EWB and removed obstacles that frequently caused last minute delays for discharge. Comments from the UDF survey suggest that continuity from day-to-day and improved efficiency helped move this number. The results for discharging patients by noon, although slightly below target, demonstrated consistent improvement in overall trending (see Table 3.0 for pre/post implementation data).

Table 3.0 Quality Dashboard – UDF Dashboard Pre/Post Implementation 2013

Pillar	*Tactic*	*Target*	*August 2012*	*6-mo.avg 2012*	*June 2013*	*6-mo.avg 2013*
Service	Discharge by Noon	15%	12.40%	12.3%	14.90%	13.7%
Quality	Reducing Readmissions	<10%	9.40%	9.70%	9.90%	9.70%
Finance	Reduce LOS	6.4 Days	5.9 Days	6.22 Days	6.8 Days	6.53 Days
Patient Satisfaction	Patient Prepared for Discharge	90.0%	88.0%	87.8%	90.60%	89.25%

The second metric that reflected success was the patients' perception of discharge planning. This measure was captured from the HCAHPS survey and represented a score received from patient satisfaction surveys. Although the six-month pilot average was slightly

less than target, the final three months of the trial phase achieved the target of > 90 percent. These data demonstrated a consistent upward trend and achievement of the goal. This improvement is consistent with workflow changes that required the UDF's to meet with the patient on admission and then daily thereafter. The new process provided continuity for the patients and allowed time to have needs addressed and met prior to discharge.

The review of data assessing 30-day all cause readmission also demonstrated positive trends. Each month of the six-month pilot demonstrated < 10 percent readmission with fluctuations between 9.4 to 9.9 percent. Readmissions are a result of many factors. Three specific tasks that were added to the UDF EWB as interventions to reduce readmissions were 1) to ensure the patient had a primary care provider at discharge, 2) to have an established return clinic visit and 3) to have discharge medications filled prior to discharge. The evidence supports these tactics in reducing readmissions by ensuring patients have established follow-up care established prior to discharge. Indicating these milestones to discharge on the UDF EWB provided a reminder to the UDF and providers to ensure completion of these key safeguards prior to discharge.

The LOS metric demonstrated positive movement during the six-month pilot and did achieve the target of 6.4/days three out of the six months. Many influences affected the LOS metric including availability of SNF beds, payer sources, and complexity of patient issues. One significant change did occur during this period of time that may have affected this data and will continue to affect future efforts to reduce LOS. Historically, SNFs in the state of Washington accepted patients that had applied for Medicaid status but were not yet approved. These patients were placed on "Medicaid Pending" insurance status. The SNF's experienced little risk in this model as the hospital would be responsible for the charges if the Medicaid applications were not

officially approved. The hospital assumed risk to ensure patients fully met Medicaid eligibility requirements prior to consigning to pending status. In April 2013, there was a regulatory reversal in the decision that allowed the SNF's to accept the Medicaid-pending status. In the reversal of this stipulation, the SNFs no longer accepted patients until the application was officially approved. This ruling extended the LOS for many patients during this time frame while awaiting complete Medicaid approval. The UDF manager proffered that this change had a relevant impact on the LOS measure and will continue to affect this measure in the future.

The return on investment for this project was estimated using finance-based assumptions and actual dollars figures where possible. The initial dollar savings recognized was a direct result from reducing two full-time equivalent (FTE) to the UDF program. For the six-month pilot period this amounted to 100,000 dollars. During the period of January to June following implementation, the hospital experienced a reduction in readmissions by 120 patients from the prior six-month period. Using a 10,000 per readmission figure determined by finance, the estimate of cost avoidance was 1,200,000 dollars. To the negative, the LOS figures demonstrated a net loss of <609,349> dollars due to a total of 1,015 extra patient days in the six-month trial period. This figure was multiplied by a 600 dollar per day cost assigned by the finance department. Determining the cost benefit was computed by incorporating the defined FTE savings, the estimate of savings from the reduction in readmissions, and further subtracting for the additional LOS dollars. This calculation resulted in a positive estimated cost-benefit to the organization of 690,000 dollars (see Appendix Y for ROI).

The final measure of success was in evaluating the functionality of the web-based UDF EWB discharge pathways. According to the UDF manager, the UDF's were provided an electronic survey tool to furnish input into the rollout strategy and functionality of the UDF

EWB tool with an ensuing 83 percent response rate. This author was not given permission to review the actual surveys or results but was provided with a summary of comments. Overall the summary revealed pros and cons with the tool for aspects of functionality and usability and also included comments about the training and rollout. The greatest benefit was found in the format of the UDF, UM, and Pharmacy notes, having access to the anticipated discharge date and the icons used to convey messages in general. These sections were utilized most often and provided the most usable information to facilitate discharge. The UDF's as a whole agreed the biggest benefit overall was in the ability of the tool to help them organize their patients by keeping track of which patients were discharging (sorting by date), and the functionality that identified which patients had orders completed or medications faxed to pharmacy. Comments reflected this tool prevented duplication of work and helped with efficiency and the ability to know at-a-glance what was left to do for a patient to be discharged.

Other comments reflected the design features that did not work as well. Many were displeased that the information did not integrate into the EMR. One comment reflected the concern that the EWB's did not go-live at the same time in all units causing confusion and also that the UDF EWBs were running slow at first. Many commented on the time-out feature and continue to find the 15-minute time-out frustrating (see Appendix Z for UDF survey tool).

These data and comments provided administrators with continued opportunity to improve process. Following further trends and making iterative changes in practice to improve outcomes is an essential part of the PDSA cycle. A positive gain was an increased understanding of the relationship between the UDF work and patient outcomes. The positive trends helped cement the improved workflows with the UDF team.

The improvement effort provided insight into the multifaceted process of discharging patients with complex care needs. From the initial root cause analyses, to mapping the current state and clarification of each role, this process defined and outlined every step for every role associated with a gold standard discharge for each patient. This process resulted in the creation of performance standards with which to hold staff accountable to these expectations. The intention is that over time, performance will improve and workflow sustainability will be achieved.

There were competing priorities that surfaced during the project implementation that altered the process and created frustration within the project team. The inherent leadership structure and reporting relationships directed to the PI Steering Committee ensured that competing organizational agendas were evaluated and prioritized at the highest level. At times, these decisions were not in alignment with project team agenda requiring strategy modification. One decision called for the abandonment of the UDF iPad pilot. Initially the UDF EWBs were to be accessed on iPads to enable the UDFs to easily move from patient room to patient room and update the EWB instantly. However, due an organizational inability to track and secure small and attractive assets, an executive decision was made to abandon the iPads in exchange for workstations on wheels (WOWs). This was a disappointment for the team. The WOWs were abandoned in the early pilot due to an inability move freely in and out of isolation rooms without considerable additional work. The project sponsor was obliged to navigate both positions to maintain organizational support while also maintaining enthusiasm of the team.

There are many future implications for further development of this work, as pay-for performance becomes the norm. Refinements will be made to the tool, other service lines may be added and procedures may be enhanced. There remains opportunity to improve adoption by

the ancillary departments and improvement in the connections between pharmacy and the nursing units. The functionality while available is not being utilized to full amplitude. In maximizing the operational capabilities of this tool, there are potential gains that could improve patient and operational outcomes further.

Conclusion

Integrating technology into the workflow to assist in the communication of discharge milestones can provide another tool to help the care team expedite discharge and reduce LOS. In complex hospital environments, discharge teams must be nimble in order to capture scarce post discharge placements when available for patients with complex social and medical histories. To achieve these goals, a multi-disciplinary coordinated strategy that starts on admission and standardizes early identification and resolution of unmet needs over the course of the hospitalization is required (Bowles et al., 2003). In order to secure highly sought-after placements, all milestones to discharge must be recognized early and addressed in advance. Case managers and discharge planners recognize the need for team orchestration in achieving timely discharge when seeking post hospitalization placement for highly complex patients. Technology offers a promising solution to align the team and streamline communication pathways to enhance the discharge process.

Through the use of existing technology an electronic discharge pathway was created using a repository of discharge milestones to create an interactive communication infrastructure to share sequential discharge information. This process was a collaborative venture between the patient care team and the IT department to reduce fragmentation, loss of information, and discharge delays. The UDF EWB tool was based in evidence and was inexpensive to implement given the existing ADT/REG platform. This new functionality has proven effective in

consolidating all necessary discharge information. The early results are promising, although it is too early to capture trended longitudinal outcome data. The use of a technology solution that enhances multidisciplinary team communication to convey discharge milestones helps to eliminate communication gaps and improve timely and efficient discharge coordination.

This project is significant in that creating solutions that reduce barriers that disrupt discharge and patient flow ultimately affect quality and safety as well as the financial bottom line. Improving communication and coordination of discharge planning supports the need for safe and timely discharge, meeting organizational goals of appropriate bed utilization, enhancing throughput, and allowing access for elective populations. Securing timely discharge is becoming an organizational directive nationally, and failure to achieve timely discharge results in inappropriate occupancy of inpatient beds. The move to value-based purchasing intensifies the need to maximize efficiencies and reduce readmissions. Given these considerations, it is imperative to enhance knowledge flow around patient specific discharge information. Using technology as a platform to facilitate communication can help to achieve these goals.

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APPENDIX A

HARBORVIEW MEDICAL CENTER
Patient Care Services

Job Description
UNIT DISCHARGE FACILITATOR

CORE VALUES: This job description is based on the following core values.

CORE VALUE COMPETENCIES:

1. QUALITY OF WORK
2. MISSION CENTERED PROFESSIONAL PRACTICE
3. INTERPERSONAL SKILLS
4. INTEGRITY AND COMPASSION
5. PATIENT CARE ADVOCACY
6. TEAM WORK/COLLABORATIVE PRACTICE
7. PATIENT/FAMILY SATISFACTION/CUSTOMER SERVICE
8. RESPECT FOR PATIENT CONFIDENTIALITY

POSITION DESCRIPTION AND PERFORMANCE CRITERIA:

TITLE: **UNIT DISCHARGE FACILITATOR**

RESPONSIBLE TO: Reports to UDF Nurse Manager, with liaison to unit Nurse Manager; works collaboratively with the Director of Care Management.

SUMMARY: The Unit Discharge Facilitator (UDF) coordinates all aspects of care leading to an efficient discharge or transition to the next level of care. The UDF functions as a liaison to patients, families, medical teams, nursing staff, social services, interdisciplinary team members, consulting and referring physicians and agencies involved in the care of patients from admission through the discharge process. The UDF identifies and eliminates barriers to discharge, obtains the daily medical plan, and communicates the discharge plan to appropriate team members.

1. Current license to practice as a Registered Nurse in the State of Washington.
2. Minimum of three years professional nursing experience in Trauma/General Surgery, Critical and/or Acute Care, Emergency Care.
3. Effective interpersonal skills, leadership skills, and clinical expertise in the care of acute care patients.

Reference: Registered Nurse III Higher Education Board approved specification for Class Code 6230.

Unit Discharge Facilitator

Specific Responsibilities

1. Participates in orientation of residents serves as coach/consultant re: care and system issues.

2. Screens admissions for potential needs.
3. Anticipates care needs and required actions as the patient progresses toward discharge to meet anticipated discharge date.
4. Monitors clinical recommendations made by consult physicians and facilitates implementation.
5. Assures that the plan of care and recommendations for discharges are communicated to the primary service group and to patients and their families.
6. Consults with and supports social workers, therapists, care coordinators and charge nurses.
7. Provides information and direction to patients and their families in relation to support groups and community services.
8. Facilitates admissions to SNFs, Rehab, Respite and other facilities.
9. Consults with Patient Financial Counselor to obtain insurance benefits when appropriate. Documents on admission and updates discharge plan daily to ensure interdisciplinary communication with the discharge plan and barriers.

Facilitation

1. Is knowledgeable about plan of care for patients on team.
2. Conducts daily team huddles with the discharge team to identify barriers to discharge and address LOS.
3. Works effectively with interdisciplinary team.
4. Meets each patient within 24 hours of admission and begins discussions about anticipated LOS, discharge needs and possible disposition.
5. Identifies financial status and facilitates early intervention to address any financial barriers to discharge.
6. Aware of variance days and discusses potential alternatives with physician of record.
7. Works with patients and families to set appropriate discharge time for day of discharge ensuring all pending requirements are complete.
8. Works with social work coordinator on SNF and difficult placement issues.
9. Ensure patients and families are kept up to date on plan of care.
10. Ensures early referral to the extreme team when patients demonstrate multiple known barriers to acceptance in SNF or other facility.
11. Available to staff for consultation and assistance.
12. Patients experience minimal delays in discharge process.
13. Assists, resolves, or appropriately refers customer service issues.
14. Offers expertise to hospital initiatives on protocol development.

Standards of Practice

1. Demonstrates competency in physiologic Health Status assessment and psychosocial status of the patient and family.
2. Demonstrates competency implementation of the plan of care.
3. Seeks appropriate consults when necessary and follows up to ensure communication.
4. Suggests and monitors timely completion of consults, procedures, diagnostic tests and milestones.
5. Participates in patient care conferences as needed.
6. Efficiently influences the implementation and the interventions identified in the plan of care.
7. Evaluates the patient's progress toward attainment of outcomes and intervenes as appropriate.
8. Demonstrates competency in documentation using the electronic medical record to document discharge plan.
9. Effectively communicates the plan of care to the team based on health status.

Standards of Performance

1. Continually seeks to improve own professional nursing practice.
2. Acquires, maintains and applies current knowledge in nursing practice.
3. Contributes to the professional development of peers, colleagues and others.
4. Decisions and actions on behalf of patients and families are determined in an ethical manner and in collaboration with appropriate team members.
5. Considers factors related to safety, effectiveness and cost in planning and developing patient care.

Professional Accountability

1. Demonstrates awareness of and functions within PCS and Medical Staff policies, procedures and guidelines.
2. Seeks consultation when patient care needs exceed own level of experience.
3. Demonstrates awareness of and functions within safety, infection control, emergency, and equipment guidelines.
4. Demonstrates accountability by being responsible for attendance and flexibility of scheduling.
5. Meets attendance standard.
6. Consistently completes timesheet requirements.
7. Ensures license is current.
8. Ensures mandatory certification competencies are completed within initial time frame.
9. Consistently wears identification badge per hospital policy.
10. Responsible for remaining current with information disseminated through email, voice mail, memorandums and posted notices.
11. Utilizes chain of command appropriately.
12. Demonstrates calm, efficient demeanor, is tactful and positive.

Standards of Daily Practice/Peer Review

1. Serves as an effective liaison between attending and resident physician.
2. Works collaboratively with social work and utilization review to develop discharge plan.
3. Communicates medical plan to nursing staff as needed.
4. Participates in discharge planning rounds with resident MD's focusing on the daily plan and barriers to discharge.
5. Communicates discharge plan to appropriate nursing staff, assures discharge teaching is completed by target LOS.
6. Consults with off service teams to obtain the medical plan and discuss barriers to discharge.
7. Identified as a role model by other staff.

I have read and understood my job description. I also understand that my performance will be evaluated based on my ability to meet the responsibilities outlined above.

Appendix B

Root Cause Analysis
(CONFIDENTIAL)

Event Description

On Friday morning, June 3, 2011 at 9:18am a failure occurred in the discharge process resulting in a delayed discharge. Mr. J. was a complex patient with numerous care needs and rejected by over 160 placement facilities. He was on variance status and had accrued 72 avoidable days during his placement phase.

On this day an adult family home (AFH) unexpectedly agreed to take Mr. J. due to an unanticipated vacancy, however the location was on the other side of the mountain requiring a plane flight. Complex arrangements were rapidly completed including a taxi to the airport and flight to Spokane.

This failure affected the entire organization, as this occurred during a period the hospital , was on high census alert. Mr. J. was one of 24 patients designated on variance status. The emergency department had 36 boarders, the PACU had 12 boarders and the OR was delayed.

This investigation may result in the need to make process or procedural changes, or other modifications. As previously stated, all findings and corrective actions will be formally communicated with the executive team.

Chronology of Events/Timeline

9:00 AM - Friday June 3rd 2011 UDF (M.S.) Received a call from B.H. Adult Family Home (AFH) accepting Mr. J. for placement.

9:02 AM - 10:00 M.S. contacted SW (A.C.) to arrange airline ticket and transportation to and from HMC to Seatac Airport and from Spokane Airport to B.H. AFH.

9:07 AM – UDF notifies MD (F.S) via paging operator of patient acceptance to AFH and receives orders for discharge.

9:10 AM - B.H. AFH calls back requesting that patient come with discharge prescriptions due to inability to obtain.

9:20 AM – UDF pages MD via paging operator to write discharge prescriptions. No response.

9:30 AM – UDF pages MD again.

9:35 AM – MD responds.

9:40 AM – SW announces all transportation arranged for a flight at 2pm. Patient must arrive to the airport by 12:30 PM. with a medical escort to the gate.

9:45 AM – MD arrives with discharge prescriptions.

10:AM – UDF faxes prescriptions to the discharge pharmacy identified with a "high priority" stamp.

11:00AM – Patient is readied for discharge pending discharge medications.

11:15AM – UDF contacts pharmacy to determine status of discharge prescriptions. Pharmacist (K.N.) acknowledges that he cannot fill due to lack of preauthorization by insurance company.

11:18 AM. - Unit-based financial counseling representative (M.H.) paged to determine status of preauthorization.

11: 20 AM – UDF contacts the financial counseling (FC) office and leaves message.

11:30 AM – FC supervisor overhead paged.

11: 32 AM – FC supervisor (M.M.) calls back. Agrees to follow up.

11:50 AM - UDF contacts FC supervisor via paging operator to determine status of preauthorization.

12:00 Noon – Patient misses taxi to the airport.

12:05 PM – UDF contacts B.H. AFH to determine options for medications without success.

12:30 PM – Pharmacy notified of pre-authorization from FC supervisor. Pharmacist (K.N.) at lunch. Prescriptions now placed into the urgent queue with other urgent orders. Relief pharmacist (J.T.) processing the urgent queue of discharge medications.

2:00 PM – Discharge prescriptions ready.

2:00PM – Patient misses flight.

Investigative Team and Method

The Chief Quality Office who oversees all hospital quality initiative has selected the investigative team for this RCA. The following individuals comprise the team:

- SM– Assistant Administrator for Patient Care Services and Administrative Director for

the UDF program.

- Dr. TD – Associate Medical Director
- PC- Administrative Director for Quality Improvement
- UDF Manager
- Social worker
- UDF
- Pharmacist KN
- Pharmacist JT
- Financial counseling supervisor
- Financial counselor.

Findings and Root Cause

Human Factors	**Equipment Factors**	**Environmental Factors**
• Staffing- FC sick • UDF managing numerous discharges with conflicting priorities • Lunch break continuity • High census management – competing priorities • Competency	• Defective equipment • Lack of IT integration • Lack of voicemail forwarding from FC office	• Inability to hear paging operator in the basement
Information Factors	**Communication Factors**	**P & P Factors**
• Communicating urgency with pharmacy • Inability to communication discharge priorities to the care team simultaneously • Inability to consolidate information • Unclear information • Lack of technology	• Among all members of the care team • Inability to reach team members urgently • Inability to establish priorities within priorities • Between MD and UDF	• Preauthorization procedures • 3-tier medications • Filling prescriptions without preauthorization

Summary:

Breaches in communication created numerous downstream delays that resulted in Mr. J. missing a discharge opportunity. This missed opportunity affected hospital throughput, LOS and patient satisfaction. Of note is the rework required to discharge this patient due to numerous breaches in process, communication and procedure. Based on the investigation conducted for the failure event on June 3rd, 2011, the team has determined several findings regarding this event:

1. Inability to consolidate changing information
2. Inability to establish a group priority so each member could focus on the same discharge circumstance.
3. Inability to hear overhead pages in the basement
4. Role clarification
5. Procedure competency

Based on the above findings the investigative team has determined that the root cause for the discharge delay involving Mr. J. was based in the inability to communication effectively to the care team in an urgent manner.

Corrective Action/Recommendation

Based on the findings of the failure event on June 3rd, 2011 the Root Cause Analysis (RCA) team has determined the following corrective action to prevent a repeat of this incident:

1. Charge the Transformation of Care committee with determining the mechanism for improvement on the identified issues. Numerous issues involving multiple disciplines warrant multiple teams, assessments and strategies.
2. Request an action plan be devised to mitigate specific communication and policy breaches.

Submitted By: Redacted Date: July 10, 2011

Appendix C

Evidence Summary Tool/Discharge Planning

Article #	Author and Date	Evidence Type	Sample, Sample Size & Setting	Intervention and Outcome Measures	Study Findings	Limitations	Evidence Level & Quality
1	Balaban et al. (2008)	RCT	N=96 patients 100-bed Community Hospital	Intervention: "User-friendly" patient discharge form Outcomes: • No follow-up in 21 days • ED visit w/in 31days • Readmit w/in 31 days • No PCP workup	• Only 25.5% of intervention group (IG) had 1 or more undesirable outcomes compared to 55.1% of control group (CG). • 14.9% of IG failed to follow-up in 21 days compared to 40.8% of CG • 11.5% of PCP workup in IG compared to 31.3% in CG.	• No evidence to support 21-day follow-up. • One hospital studied • All patients had PCPs in the system- not reflective of other facilities	Level- I Quality-B
2	Foust (2007)	Qualitative	N=8 nurses Academic Medical Center 32-Bed surgical unit	No intervention • Direct observation and interviews Outcome: • Capture evolving nature of discharge planning	• Interviews revealed the more cognitive aspects of discharge planning (expectations, evaluation and judgments of patient readiness. • Observations discovered how nurses integrated patient teaching into their interactions with patients. • Documentation of discharge planning is scarce.	• Focused on one patient group only and may not reflect needs of other populations • Only studied on dayshift	Level-3 Quality-C
3	Huang and Liang (2005)	RCT	N=126 hip fracture patients 3970-bed Medical Center Taiwan	Intervention: • Designated discharge nurse providing individualized plan, education, one home visit and phone calls.	• IG demonstrated 1.84 shorted LOS • IG patient and family experienced more positive perception of readiness for discharge • Length of time to readmission was significantly	• IG received more attention, which could have affected outcome. • Limited to one hospital	Level-I Quality-C

				Outcomes: • Length of stay • Readmission rate • Repeat falls • Perception of readiness for discharge.	longer than CG.		
4	Jack et al. (2009)	RCT	N=749 medical patients General medicine service at an urban, academic, safety net hospital.	Intervention: • Nurse discharge advocate to work with patients during hospitalization. • Pharmacist follow-up post discharge Outcomes: • ED visits and readmits within 30 days • Self-reported preparedness for discharge • PCP follow-up within 30 days of discharge.	• IG demonstrated decreased hospital utilization ED visits and readmits within 30 days by 30%. • IG self-reported preparedness for discharge more often than CG $p<0.007$ • IG reported higher PCP follow-up rate within 30 days $p<0.001$.	• Nature of safety net hospital included younger patients with fewer co-morbid conditions than other studies and may not be general-izable to other populations • Relied on self-reporting of information not able to be retrieved from EMR • Single center study in which not all eligible patients could be enrolled.	Level-I Quality-A
5	Lambrinou et al. (2012)	Meta-analysis	19-RCTs Heart Failure management programs	• Nurse-led discharge planning Outcomes: • Reduce readmission rate	• Results suggest that these programs can achieve significant reduction in re-admission rates. RR =. 68; 95% CI (0.53, 0.86). • However, inconsistency regarding interventions,	• Excluded studies that used advanced technology for remote manage-ment of patients.	Level-I Quality-A

					intensity, setting, participants and length of follow-up produced heterogeneity across studies. • Subgroup analysis indicated that home care and telephone interventions resulted in significantly lower readmissions for HF patients.	• Only reports published in English were reviewed • Included studies varied in patient characteristics and methodological quality. • Applied research strategy may have missed or failed to identify some important reports.	
6	Legrain et al. (2011)	RCT	N=317 geriatric patients Six acute geriatric units Paris	Intervention: • Dedicated geriatrician different from CG targeting three risk factors for preventable readmissions: • Comprehensive med review • Education of self-management of the disease • Detailed transition of care communication Outcomes: • ED visits or readmit at 3 month and 6 month post-discharge.	• 23% of IG participants were readmitted to ED or hospital compared to 30.5% of CG at p=0.03. • 35.5% of IG were readmitted to ED or hospital within 6 months compared to 40.8% of CG at p=0.15. • Event free survival was significantly higher in the IG at 3 months (hazard ratio =0.72, 95% CI. P=0.03, but not at 6 months HR=0.81, 95% CI p=0.10	• Data for the primary outcome were collected without blinding to group assignment for the last 3rd of participants but were blinded to the first 2/3rds.. • 380 patients were not included due to lack of consent • Unclear which component of the multimodal design was most important to	Level-I Quality-A

						reduce readmit. • Excluded patients with LOS<5 days.	
7	Lin et al. (2009)	RCT	N=50 hip fracture patients Four orthopedic wards at 2800-bed hospital Taipei	Intervention: • Group received comprehensive discharge planning including assessed discharge planning needs, providing discharge instructions, coordinated services, and determined discharge placement. Outcomes: • LOS • QOL • Self-care knowledge • Functional status	• LOS was not significantly different • Self-care knowledge was significantly higher in IG p=0.001. • Significant improvements in functional status of both groups. • At 3 months post discharge, QOL in IG was better than the CG p=0.004.	• Small sample size • Although 400 patients were admitted during this period, most had cognitive impairment	Level-1 Quality-B
8	Nosbusch et al. (2010)	Integrative Review qualitative; quantitative; and mixed qualitative/ quantitative.	N=38 articles met inclusion criteria consistent with aims to stimulate knowledge development around the bedside nurse role in hospital discharge planning	• Interventions: diverse • Outcomes: Searching for categories that could be analyzed for common patterns and themes within and across study types.	• Seven themes were identified across the studies: 1. Communication-both verbal and written 2. Systems and structures 3. Time 4. Role confusion 5. Care continuity 6. Knowledge 7. Invisibility of nurse in discharge planning	• Key question was unclear. • Triangul-ation was evident in the majority of qualitative studies. • Themes were presented separately but may interact in acute care settings. • Because the	Level-IV Quality-B

						research designs and hypotheses of quantitative studies were diverse, it was not appropriate to use statistical methods of meta-analysis. Therefore a constant comparison method was used.	
9	Puschner et al. (2011)	RCT	N=491 adult high-utilizer psychiatric patients Five psychiatric hospitals Germany	Interventions: • IG received formalized needs-led discharge planning and monitoring intervention with two intertwined sessions administered between IG and CG. at discharge and 3 months post discharge. Outcomes: • Reduce readmission rates	• Randomization produced no substantial difference between IG and CG related to admission rates. • Intention to treat analysis revealed no differences between groups. • Cannot recommend for implementation in routine care.	• Only studied in German hospitals • Psychiatric patients may not be generalizable to other populations	Level-I Quality-C
10	Sheppard et al. (2010)	Meta-analysis of RCTs (Cochrane Review)	N=21 RCTs All patients were hospital inpatients	Intervention: • Compared an individualized discharge plan with routine discharge care that was not tailored to the	• There was small, significant reduction in hospital LOS for those allocated discharge planning. • For elderly patients with HF there was a small, significant reduction in readmission	• Key issue in interpreting the evidence is the definition of the intervention and subsequent understanding of	Level-I Quality-A

				individual patient. Outcomes: • Length of stay • Readmissions	rates. • Insufficient evidence that discharge planning made a difference to patients discharged home or residential care.	the relative contribu-tion of the elements. • Not possible to assess how some components compared between trials. • Country specific arrangements may influence discharge • Trials were excluded where discharge planning was not the main focus of multifaceted package of care.	

Appendix D

Evidence Summary Table/Handoffs

Article #	Author and Date	Evidence Type	Sample, Sample Size & Setting	Intervention and Outcome Measures	Study Findings	Limitations	Evidence Level & Quality
1	Abraham et al. (2012)	Qualitative	N= 60 Academic Medical Center 16-Bed MICU	Intervention • Compared SOAP note to: • HAND-IT checklist Outcomes • Demonstrated support for error detection • Resilient to breakdowns in communication • Supported coordination of information flow	3 measures to evaluated the efficiency of handoff documentation using two tools: 1. Information breakdowns 2. Decision making breakdowns 3. Expertise Differences • Significantly more information missing using SOAP p<0.0001 • Significantly more changes to plan of care with SOAP p<0.001 • Resident usage of SOAP led to 3.2 fewer numbers of missed problem list items and usage of HAND-it let to 2.92 more number of missed items than interns.	• Single MICU setting. May not be generalizable • Did not report on unintended workflow effects.	Level- 3 Quality- B
2	Braff et al. (2011)	Literature Review	N= 59 papers DON University of Melbourne	Conclusions: Any document or documentation deficient in detail, currency, accuracy, availability or its function can compromise information transfer and the coordination of patient care.	The findings generated 5 major themes: • Design of documentation • Quality of documentation • Accuracy of documentation of work activities • Functions of documentation • Documents that coordinate verbal communication	• Structured literature review not a formal systematic review • Single reviewer selected the key papers for inclusion	Level- 5 Quality- A
3	Chen et al. (2011)	Qualitative	N= 30 Handoffs Duke University Hospital	Intervention: • Implementation of post-operative handoff process Outcomes:	• Protocol attendance rate at handoff 97% (95% CI: 93% to 100%) • Protocol required content averaged 53 % (95% CI: 35% to	• No communication metrics were recorded to determine	Level- 3 Quality- C

			PICU	Unrealistic to expect perfect conformity to such a complex process: • Reliability of attendance at observed handoffs • Reliability of content reporting at observed handoffs • Number of distractions during the communication for each handoff	71%) • Sterile cockpit (distractions) 21%. Mean of 9.0 (SD 2.8) distractions per event. This equated to 2.3 distractions per minute of conversation	improvement • Possible Hawthorne effect • Convenience sampling • Single observer- may limit reliability of the data	
4	Clarke et al. (2012)	Quality Improvement	N= 29 nurses Health Sciences Center Winnipeg, Manitoba, Canada 5 Hospitals	Intervention: • Appreciative Inquiry (AI) to determine what is working well in patient handoffs • Interviews for primary data collection • Design of handoff process Outcomes: • Project successful in demonstrating AI as a quality improvement method to build trust among stakeholders	• Checklist trialed over a 4-week period without sustainability due to multifactorial reasons. • Staff was engaged in the AI process. • Nurses prefer face to face handoffs • Quiet place to prepare • Time for preparation and speaking to patient and family • Standardizes verbal report • Transfer checklist	• No metrics presented • No data analysis to quantify assumptions	Level- 5 Quality- C
5	Craig et al. (2012)	Qualitative Academic Hospital	N= 26 interns	Intervention: Comparison of 3 morning handoff protocols consisting of written, electronic, face-to-face. Outcomes: A scheduled face- to- face process had the fewest protocol deviations and	Study measures analyzed for failures in handoff protocols w/ or w/o missing information. • Interns I Phase 1 – written- had 9 times greater risk of reporting protocol failure c (95% CI: 1.2, 65.6; p=0.009) compared to Phase III – face-to-face. • Interns in Phase II- electronic-	• Conducted in an internal medicine residency program at a single teaching hospital. May not be generalizable. • Results from interviews	Level- 3 Quality- B

				demonstrated best communication of essential patient care information.	Had 7.4 times greater risk of reporting protocol failure compared to Phase III. (95% CI: 1.1-54.1; P-0.016)	conducted at the end of the month depended on accuracy of recalled information. • Intern progression through training may have affected the quality of handoffs overtime. • Focused on handoffs and not outcomes	
6	Fudickar et al. (2012)	Literature Review	N=20 Studies	Intervention: Surgical Checklist Outcomes: A retrospective study revealed that the use of the WHO surgical checklist could have prevented 14.9% of all wrong-side marking errors and 85.3% of all wrong side errors that did lead to surgery on the wrong side.	• Statistically significant relative reduction of mortality in major surgery by 47% • Statistically significant relative reduction of major morbidity by 36%	• No reference to data analysis to demonstrate statistical significance	Level-5 Quality-C
7	Halm (2013)	Literature Review	N=7	Intervention: • Standardized change-of-shift report and interdepartmental handoffs. Outcome: • Positive impact on	Highly reliable handoffs incorporate 3 key elements: 1. Face-to-face 2-way communication 2. Structured written forms, templates or checklists that allow clinicians to agree on minimum essential data that	• Did not describe search methods • Small N	Level- 5 Quality-C

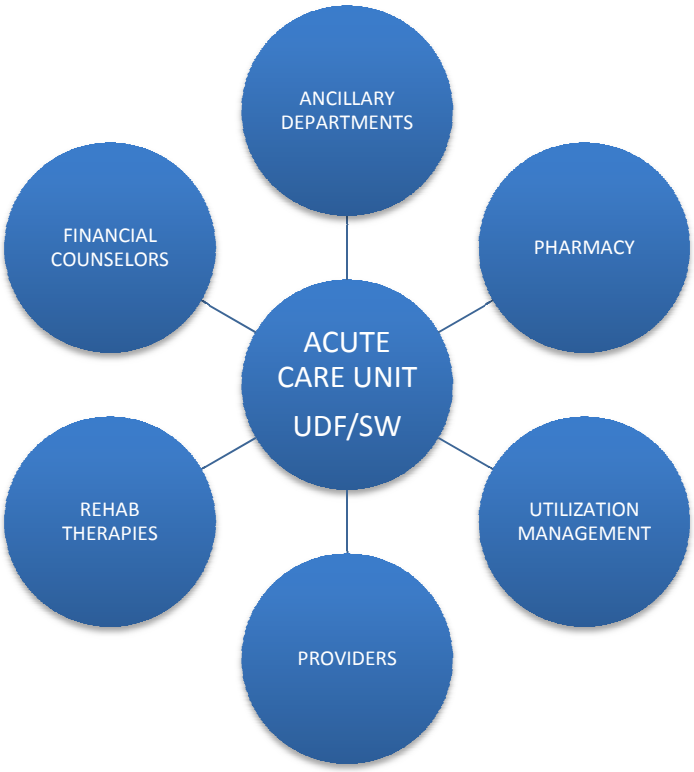
				many processes and outcomes	create a shared mental model 3. Content that "captures intention" 4. Mnemonics introduce redundancy to help organize and convey complex issues		
8	Holly & Poletick 2013	Meta-synthesis	N= 29 studies	Studies represented > 800 handoffs and 300 nurse interviews.	▪ Synthesized findings: 1. Individual nurses influence patient care as the gatekeeper of information handed off that is used for subsequent care decisions 2. There is an imbedded hierarchy in relation to the handing over of information that serves as a method of enculturation into the nursing unit.	• 125 Qualitative studies met inclusion criteria. Of those 50 were retrieved for appraisal by two reviewers with 29 included. Other findings may have been discovered with other selected articles.	Level -3 Quality - B
9	Joy et al. 2011	Quasi-experimental	N=41 (pre) N=38 (post)	Intervention: ▪ Teamwork driven handover process ▪ Checklist of key elements	▪ The mean number of technical errors per handover was significantly reduced from 6.24 (95% CI, 5.57-6.91) to 1.52 (95% CI, 1.01-2.02; p<.0001) ▪ The mean number of information omissions per handover was also significantly reduced from 6.33 (95% CI. 5.57-7.10) to 2.38 (95% CI, 1.74-3.01; P< .0001)	• Single observer design collecting data in real-time may have led to missed data. • Single center study and success may be due to unique institutional features	Level 2 Quality-B
10	Manser et al. 2010	Qualitative	N = 126 patient handoffs	Intervention: ▪ Rating tool for handoff quality	▪ Rating tool identified 3 factors predicting handoff quality: o Information transfer ($r=0.54$, $p \leq 0.001$) o Shared understanding ($r=0.40$, $p \leq 0.001$)	• 3 different clinical settings: (paramedic to Ed staff, anesthesia to PACU, PACU to	Level – 3 Quality-B

					○ Working atmosphere (r=0.19, p≤ 0.01).	ward nurse). Dimensional structure may not generalize to handoffs. • Subjective assessments via self-reporting for independent and dependent variables may influence the correlations.	
11	Matic et al. (2010)	Integrative Literature Review	N= 126	Intervention: To review the literature on methods and modes of delivery of handover used in current health care settings.	• Considering communication theory and factors impacting effective clinical decision making should be considered when developing nursing handover strategies • Potential advantages of electronic tools include standardization of data definitions, consistency of information communicated and minimization of ambiguities,	• Did not review on methods and modes as stated in the title.	Level- 5 Quality-C
12	Paull et al. (2010)	Non-experimental	N-74 VHA hospitals	Interventions: • Surgical Checklist • Medical Team Training (MTT) Outcomes: Successful in imbedding checklist-guided pre-operative briefings and post-operative briefings into the VHA safety culture	• Post checklist VHA antibiotic prophylaxis compliance rate of 97.0% ± .1% compares favorably with the 81.7% ± .3% for non-VHA hospitals. (p=.01) • Deep vein thrombosis prophylaxis compliance was higher after the implementation of the surgical checklist. (95.7% ±. 8% vs. 85.1% ±4.6%; p=. 05)	• Lack of morbidity and mortality data.	Level-3 Quality-A

13	Petrovic (2012)	Quality improvement	N= 90 surveys Johns Hopkins CSICU	Intervention: • Perioperative Handoff Tool Outcomes: • Mandates bedside presence of core handoff team • Creates series of ordered steps to guide handoffs • Separates out technology information • Provides reference checklist • Removes roles ambiguity	• Process improved communication and information sharing during handoffs, increased satisfaction of the receiving team, and decreased distractions.	• Lack of data analysis	Level- 5 Quality- B
14	Wright (2013)	Non-experimental	N= 74 CRNA's enrolled N= 30 responded 40.5%	Intervention: • Mnemonic PATIENT checklist Outcomes: • Demonstrated the need to imbed standardization and reduce variation. • Confirmed the need to promote awareness to minimize variation in transfer of care processes.	2 weeks after rollout: • 13.3 % did not use • 56.7% used the checklist 1-5 times • 16.7% used the process 6-10 times • 3.3% used it 11-15 times • 10% used in > 15 times • 100% agreed or strongly agreed that it was an effective way to organize information	• Convenience sample	Level- 5 Quality- C

APPENDIX E

HUB AND SPOKE MODEL



APPENDIX F

Gold Standard Discharge

	Patient Experience	UDF/Nursing / MD Responsibilities	Program changes
Within 24h of Admission	• Patient understands the extent of the illness/injury • Patient understands clinical targets for discharge • Patient understands predicted length of stay and targeted discharge date.	• UDF contacts Senior Resident to discuss patient and plan of care and targets for discharge. • UDF meets with patient and explains role and purpose of discharge rounds. • UDF leaves business card with patient. • UDF documents targets for discharge on the white board.	• UDF becomes the primary contact for the patient related to the discharge process • "Huddle Rounds" become "Discharge Rounds" and are conducted at the bedside with the team (UDF, SW, MD if possible, OT/PT,FC) • UDF contacts senior resident daily to discuss targets for discharge and the plan for the day if attending not present during "discharge rounds" • UDF meets with patient within 24 hours of admission to review targets for discharge.
Inpatient stay	Patient aware of special needs, equipment, treatments and medications required for a safe discharge.	Bedside RN begins preparations for impending discharge: • Begin teaching patient/family on self care, wound management, device care, medication administration • UDF writes plan for the day on the white board daily.	"Discharge rounds" occur daily at the bedside and include patient and family. Discussion items include: • plan for the day, • discharge targets, • discharge location; home, SNF • financial issues • discharge medications • co pays
2 Days Prior to Discharge	• Patient has had time to think about illness/injury and any concerns post discharge. • Patient can make arrangements for	UDF begin discussions around: • Transportation home • Where to fill prescriptions HMC/outside • Possible co pays	"Discharge rounds" discussion: • specific concerns are discussed to prepare patient for discharge. • transportation home • where does the patient want discharge

	transportation home. • Patient has time to ask family to bring in source of payment for prescriptions if filled at HMC.	• Bedside nurse to arrange rehab assessment if patient with complex injuries is going home. • UDF writes patient plan on the white board.	medications filled • is the patient aware of co-pays? Source of payment? • Discuss need for rehab assessment for discharge transfer for complex situations in preparation for transfer into the car on the day of discharge.
	Patient Experience	**UDF/Nursing / MD Responsibilities**	**Program changes**
1 Day before of Discharge	• Patient feels confident that all members of the team relay the same information relating to the plan for discharge and follow-up care. • Patient can plan for the time of discharge in terms of transportation and follow-up help at home if necessary. • Patient has opportunity to ask questions related to self care, treatments or medications that must be followed at home. • Patient identifies concerns surrounding discharge.	• UDF writes patient plan on the white board. • UDF writes proposed DC times on the white board. • Bedside nurse/UDF and physician round to clarify plan for discharge 24 hours in advance. Team is all on the same page. • Patient informed of proposed time for discharge the next day. • Review plans for transportation home, medications, supplies and any special needs. • MD writes discharge orders if possible.	• UDF becomes responsible as the primary discharge resource. Reviews all information in the discharge packet with the patient. Reviews all of the plans for discharge.
Day of discharge	• Patient feels like staff has the time to discuss any concerns.	• MD writes discharge orders early to facilitate targeted	• UDF responsible for final discharge plan • UDF verifies prescriptions and supply needs.

	• Patient feels comfortable with self care, specialized treatments and medication administration that must be followed at home. • Patient understands plan for discharge • Patient understands discharge instructions • Patient understands plan for follow-up care.	discharge times. • UDF rounds and explains discharge process to patient. • Patient informed of discharge time. • Interdisciplinary discharge form printed off and ready to sign. • Bedside nurse reviews discharge medications with the patient for understanding. • UDF reviews the discharge checklist with the patient to identify areas that remain to be discussed with patient/family.	• Transporter/HA locate all patient property

	Patient Experience	UDF/Nursing / MD Responsibilities	Program changes
Accompany Patient out of Hospital	• Patient feels prepared for discharge. • Patient is confident that all discharge requirements are met. • Patient leaves with all personal property. • Patient appreciates meeting time frames as directed. • Patient is confident that they will be safety transferred into the car.	• Escorted out of the hospital by hospital personnel. • Stop by the discharge desk • Stop by the pharmacy if meds need to be picked up. • Assist patient into the car	• Bedside RN determines the level of assistance needed to get the patient into the ca safely.
Follow-up Post Discharge	• Patient feels cared for. • Patient has an opportunity to ask questions or relay concerns.	• UDF makes follow up phone call to patient 1-2 days post discharge.	• UDF will now make the follow up discharge phone calls using a standard set of questions. • UDF will document in ORCA that the outcome of the discharge phone call.

Rev 10/14/10

Appendix G

Proposed Discharge Task Assignments and Roles for Care Management Team Members

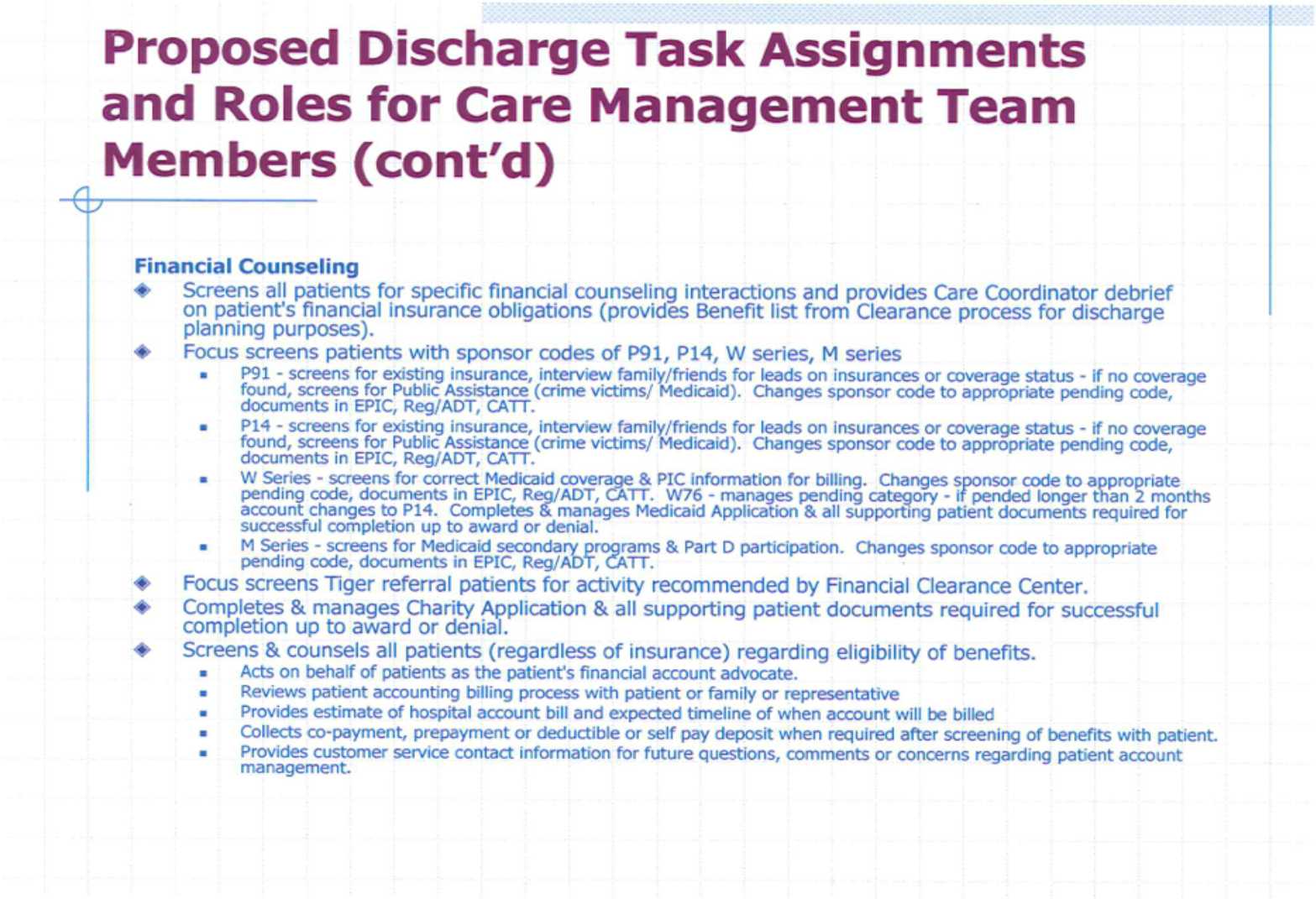
Core UDF or service ARNP Tasks
(Workgroups to update procedures)
- Hospital to hospital transfers
- LTAC transfers (Regional and Kindred)
- Medical Respite coordination
- Rehab transfer coordination
- O2
- Home IV and Option Care coordination
- Wound "Vac"
- Home tube feeding

Core Therapies DC Tasks
- DME Coordination
- DC functioning/care needs assessment
- Coordinate therapies for outpatient F/U

Core Utilization Management Tasks
- Provide input re payor casemanagement contact info for DC coordination
- Initiate, complete, and deliver decertification letter
- Provide clinical review data to insurer and obtain auth number for billing
- Review and change, as appropriate, patient admit status
- Provide UDF and team with target DC date (future planning)

Core SW Discharge planning roles
- Family education re discharge resources
- Skilled Nursing facility referral and discharge
- Adult family home referral and transfer
- Sponsorship coordination
- Non-medical respite
- Shelter referral
- Assisted living referral
- Psych hospital transfer (psych consult SW)
- VNS referral and coordination
- Psycho-social resources
- CD treatment referral and coordination
- Financial review and coordination with discharge resource referrals
- Outside agency resource referral and advocacy

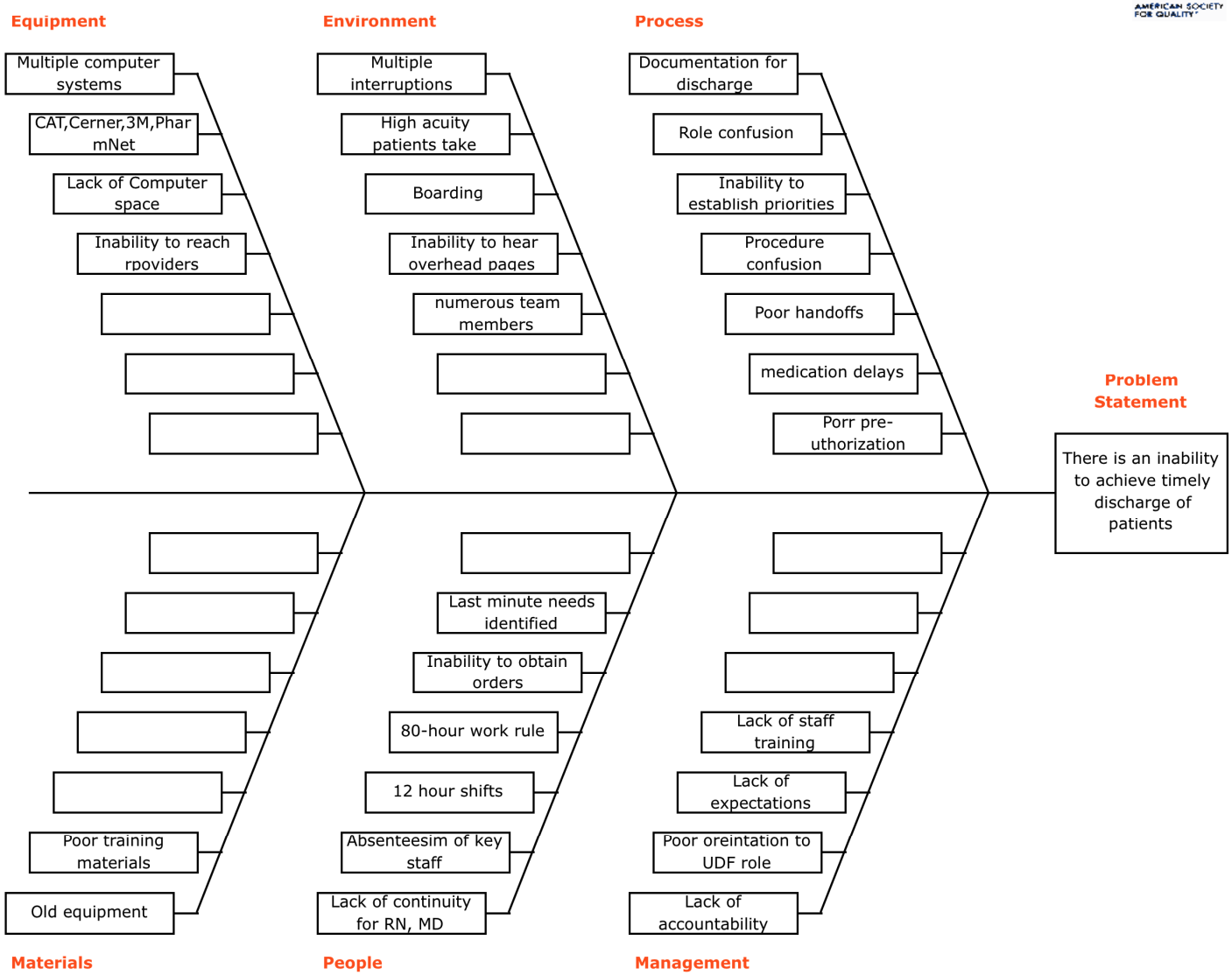
SW Assessment and coordination:
- Child Abuse
- Grief and other supportive counseling referrals
- Elder abuse
- Domestic Violence
- Sexual Assault
- Facilitate Guardianship Process
- Coordinate resolution of legal issues as appropriate
- Facilitate Alerts and Care plan as appropriate
- Educate re advance directives


Proposed Discharge Task Assignments and Roles for Care Management Team Members (cont'd)
Financial Counseling
Screens all patients for specific financial counseling interactions and provides Care Coordinator debrief on patient's financial insurance obligations (provides Benefit list from Clearance process for discharge planning purposes).
Focus screens patients with sponsor codes of P91, P14, W series, M series
P91 - screens for existing insurance, interview family/friends for leads on insurances or coverage status - if no coverage found, screens for Public Assistance (crime victims/ Medicaid). Changes sponsor code to appropriate pending code, documents in EPIC, Reg/ADT, CATT.
P14 - screens for existing insurance, interview family/friends for leads on insurances or coverage status - if no coverage found, screens for Public Assistance (crime victims/ Medicaid). Changes sponsor code to appropriate pending code, documents in EPIC, Reg/ADT, CATT.
W Series - screens for correct Medicaid coverage & PIC information for billing. Changes sponsor code to appropriate pending code, documents in EPIC, Reg/ADT, CATT. W76 - manages pending category - if pended longer than 2 months account changes to P14. Completes & manages Medicaid Application & all supporting patient documents required for successful completion up to award or denial.
M Series - screens for Medicaid secondary programs & Part D participation. Changes sponsor code to appropriate pending code, documents in EPIC, Reg/ADT, CATT.
Focus screens Tiger referral patients for activity recommended by Financial Clearance Center.
Completes & manages Charity Application & all supporting patient documents required for successful completion up to award or denial.
Screens & counsels all patients (regardless of insurance) regarding eligibility of benefits.
Acts on behalf of patients as the patient's financial account advocate.
Reviews patient accounting billing process with patient or family or representative
Provides estimate of hospital account bill and expected timeline of when account will be billed
Collects co-payment, prepayment or deductible or self pay deposit when required after screening of benefits with patient.
Provides customer service contact information for future questions, comments or concerns regarding patient account management.

Quality Tools

APPENDIX H

Fishbone Cause and Effect Diagram



APPENDIX I

Project Name	**Project Team Membership**			
UNIT DISCHARGE FACILITATOR ELECTRONIC WHITEBOARD	**Project Sponsors**	Sue Manfredi		
	Project Team Leaders	Janet H, Peter G.		
Reporting Pillar (Committee)	**Project Mgr**	*Peter G.*		
Transormation of Care Committee	**Project Structure**	***Department/Division***	***Department/Division***	**Department/Division**
Project Description	**Team Members & Resources**	IT- Tricia, Ben, Igor, Mehdi, Romel	SW- Bonnie, Pam, UM- Annette, ARNP-Julie	Pharmacy- Charlie,Beverly, FC- Jane
Create a web-based aplication that allows multiple roles to collaborate together and synchronize efforts toward discharging patients in a timely manner.		**Meeting Frequency**		
	Team Meetings:	weekly moving to biweekly	1-2 hours/per meeting	
Fiscal Year Reporting (start and end dates)	**Goals**			
2012 2013	1. Create communication pathways for each discipline. 2. Identify barriers to discharge in each discipline. 3 Create a quick and easy view of sum information that can be accessed from any workstation, 4. Create process flows of communication needs.			
Scope				
Utilize modules of the electronic whteboard system to establish communication pathways to and from the UDF, SW, pharmacy, MD, UM, FT and OT/PT. Use existing hardward and access from the web from any location in the sospital.				

Performance Indicator	**Description**	**Target**
LOS	Reduce barriers to discharge that result in delayed discharge	6.4 days
Noon Discharge	All discharge plans/teaching complete to achieve discharge by noon	15%
Patient Satisfaction	HCAHPS discharge satisfaction scores to improve patient perception of discharge readiness.	90%
Reduce Readmissions	Reduce all cause 30-day readmissions	<10/mo.

Expected Benefits

This product will allow for real time updates to the discharge plan so each provider and care team member can view the patients status to determinebarriers and next steps to discharge. Improving communication will reduce missed opportunities for discharge and enhance discharge timeliness.

Expected Barriers

Adoption of new technology, change in forkflows,

APPENDIX J- Discharge Planning Gap Analysis

1-May-11

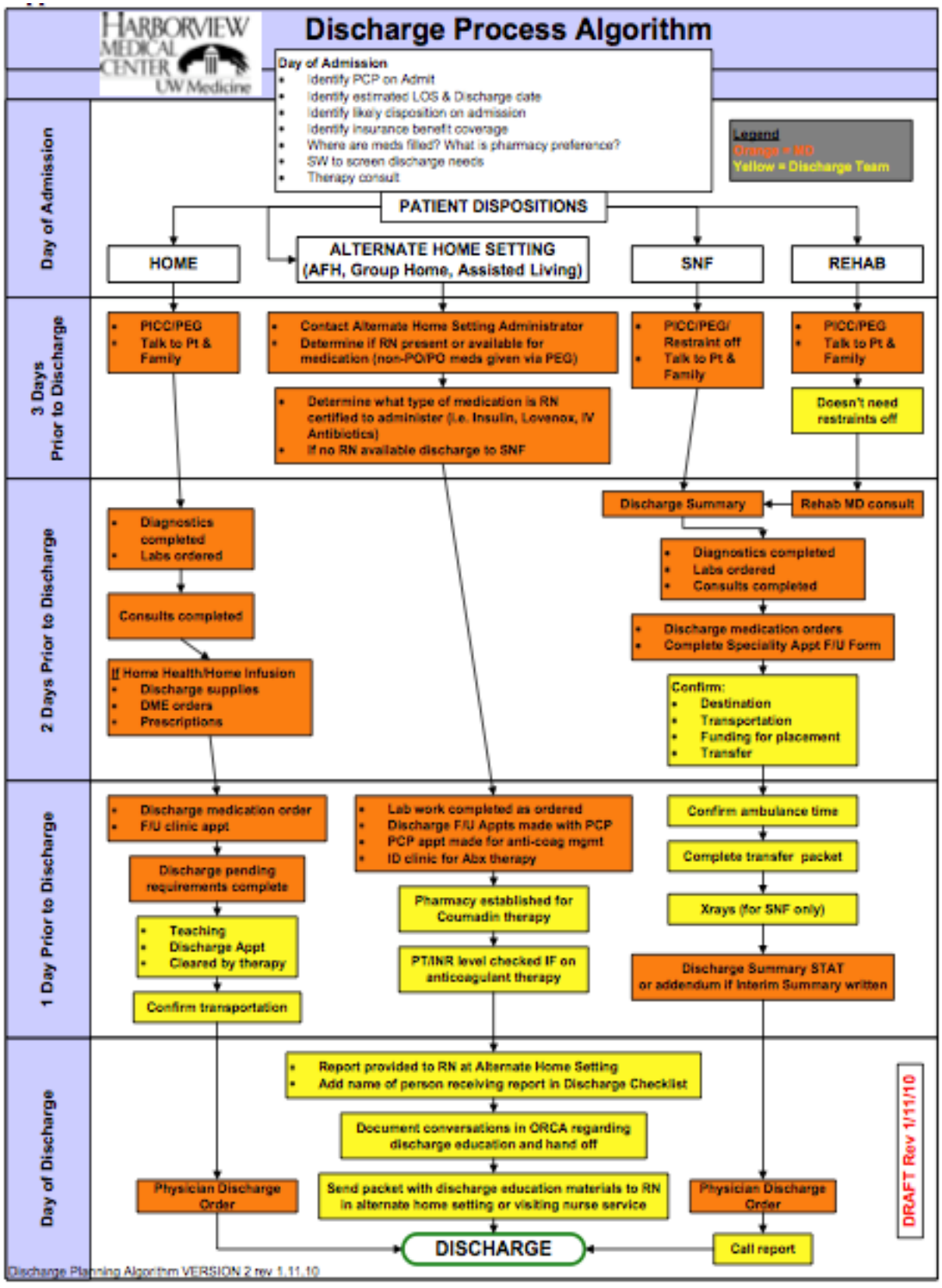
FUTURE STATE	CURRENT STATE	NEXT ACTION/PROPOSAL
Improved discharge planning handoffs	Poor handoff communication due to lack of continuity of staff	Retrain team members on Gold Standard Discharge
Transparent Communication	Poor handoff communication due to documentation tools	Clarify roles of SW and UDF
Patientsdischarged when clinical targets are met	Inability to locate salient pieces of discharge information	Restructure UDF Schedules
Ability to identifiy priorities to the whole team	Inability to visualize total discharge plan in one location	Create discharge flow algorithm
Barriers to discharge identified on admission	Poor documentation of discharge status	Define "out the door" strategy
All patients needs met by day of discharge	Poor interoperability of computer systems	Create method for improved dishcarge handoffs
Role clarification	Patient priorities overlooked	Increase continuity of information
Gold Standard discharge process fully implemented	Increased LOS due to avoidable discharge delays	Schedule retreat for discharge team members
Patients fully prepared for discharge	Disjointed discharge process due to lack of standardization	Standardize workflows on each unit
One electronic location for discharge information	Inability to relay changes in patient status easily to all team members	
Continuity of discharge information		
Standardized work flows		

APPENDIX K- Discharge Planning Action Plan

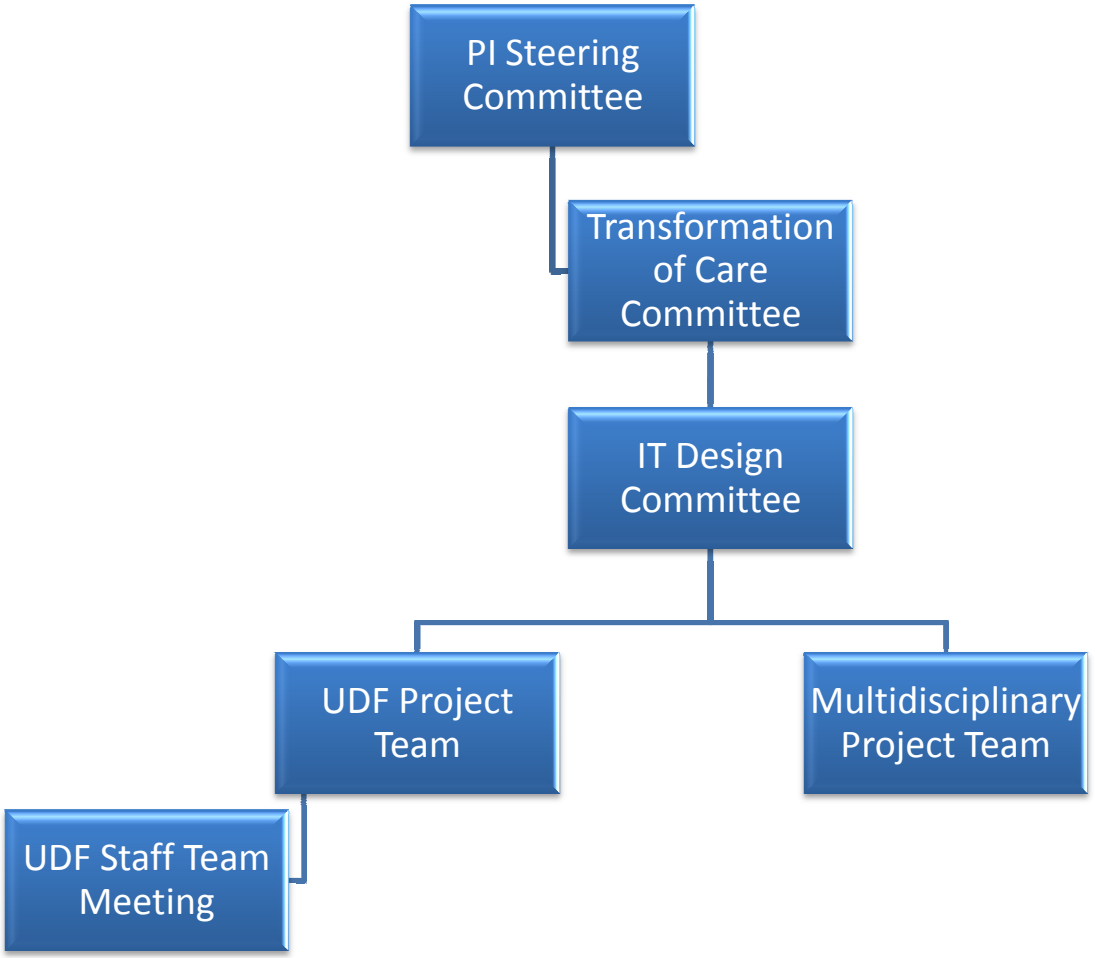
1-Jul-11

PROCESS STEPS	CURRENT STATE ASSESSMENT	IDENTIFY OPPORTUNITIES	IMPLEMENTATION PLAN	MEASURE PROGRESS	ADJUST PLANS
	Evaluate discharge process	Gold Standard Discharge not fully utilized	Retrain team members on Gold Standard Discharge	Identify outcome measures	Utilize PDCA to revise plan based on outcome data
	Evaluate workflows	Role confusion between SW and UDF	Clearly define roles to reduce duplication of effort	Capture initial metrics	Check-in with providers monthly
	Review job descriptions	Poor continuity in handoffs	Restructure UDF schedules to M-F	Review HCAHPS data on discharge	Check-in with UDF's and SW monthly
	Voice of the patient	Poor interoperability between computer systems	Create Discharge Flow algorithm	Add metrics to A to E grid. Create UDF metrics dashboard	Round on patients to determine satisfaction with process
	Voice of the provider	Poor "out the door" process	Define "out the door" strategy	Monitor dashboard monthly	
	Voice of the team member	Poor documentation of discharge status	Create method for improved discharge handoffs in increase continuty		
	Identify barriers to discharge	Clinical targets for discharge undefined			
		Inability to contact all team members easily			

APPENDIX L


Harborview Medical Center
UW Medicine
Discharge Process Algorithm
Day of Admission
Identify PCP on Admit
Identify estimated LOS & Discharge date
Identify likely disposition on admission
Identify insurance benefit coverage
Where are meds filled? What is pharmacy preference?
SW to screen discharge needs
Therapy consult
Legend
Orange = MD
Yellow = Discharge Team
PATIENT DISPOSITIONS
HOME
ALTERNATE HOME SETTING (AFH, Group Home, Assisted Living)
SNF
REHAB
Day of Admission
3 Days Prior to Discharge
PICC/PEG
Talk to Pt & Family
Contact Alternate Home Setting Administrator
Determine if RN present or available for medication (non-PO/PO meds given via PEG)
Determine what type of medication is RN certified to administer (i.e. Insulin, Lovenox, IV Antibiotics)
If no RN available discharge to SNF
PICC/PEG/ Restraint off
Talk to Pt & Family
PICC/PEG
Talk to Pt & Family
Doesn't need restraints off
2 Days Prior to Discharge
Diagnostics completed
Labs ordered
Consults completed
If Home Health/Home Infusion
Discharge supplies
DME orders
Prescriptions
Discharge Summary
Rehab MD consult
Diagnostics completed
Labs ordered
Consults completed
Discharge medication orders
Complete Speciality Appt F/U Form
Confirm:
Destination
Transportation
Funding for placement
Transfer
1 Day Prior to Discharge
Discharge medication order
F/U clinic appt
Discharge pending requirements complete
Teaching
Discharge Appt
Cleared by therapy
Confirm transportation
Lab work completed as ordered
Discharge F/U Appts made with PCP
PCP appt made for anti-coag mgmt
ID clinic for Abx therapy
Pharmacy established for Coumadin therapy
PT/INR level checked IF on anticoagulant therapy
Confirm ambulance time
Complete transfer packet
Xrays (for SNF only)
Discharge Summary STAT or addendum if Interim Summary written
Day of Discharge
Report provided to RN at Alternate Home Setting
Add name of person receiving report in Discharge Checklist
Document conversations in ORCA regarding discharge education and hand off
Physician Discharge Order
Send packet with discharge education materials to RN in alternate home setting or visiting nurse service
Physician Discharge Order
DISCHARGE
Call report
DRAFT Rev 1/11/10
Discharge Planning Algorithm VERSION 2 rev 1.11.10

APPENDIX M – COMMITTEE REPORTING STRUCTURE



APPENDIX N - UDF EWB PROJECT COMMUNICATION PLAN				
Jul-11				
Information	**Target Audience**	**Frequency**	**Method**	**Responsible Party**
Project Status Report	TOCC Committeee	Quarterly	Presentation	Sue M.
Project Status Report	PI Steering committee	Quarterly	Presentation	Sue M./Peter G.
Project Update	Nurse Managers	Monthly	Verbal	Janet H.
Project Update	Department Managers	Beginning and at Project Completion	Presentation	Sue M/Peter G.
Oversight Decisions	Project team	anytime	Verbal	Sue M./Peter G.
Project Team milestone review	Project Team	Weekly	Meeting	Tricia/Ben
Team Status Report	IT project team	Weekly	email	Peter G.
UDF Issues Report	UDF Nurses	Biweekly	Meeting	Janet H.
UDF Escalation Report	Medical Staff	Daily	Phone/Email report	Janet H.
IT Issues Report	Project manager, UDF manager, project sponsor	Anytime	Email or phone depending on urgency	All
Change requests	Project Manager	Weekly team meeting	Change form	Peter G.
Capital or Financial Implications	Exec Team	Anytime	Green Sheet	Sue M./Peter G.

Appendix O UDF EWB Budget Assumptions

Assumptions

Pilot Period January 1, 2013-June 30, 2013
1 day LOS = $600
Readmission w/in 30 days= $10,000 additional expenses and penalties
ALOS = patient days/total admissions
IT Labor is paid through overhead cost charged to all departments and not allocated to this project
Discipline specific hours contributed to this project are considered part of their normal work related duties
Training will be performed on duty time
Intellectual property remains with Newtown General Hospital
Reduction in FTE due to improved communication

Project Expense

Capital Cost

Item:	Unit Cost	Ext. Cost
iTune Acct	NC	NC
iPad2 (qty 9)	$650	$5,850
Upgrade X-server with Lion OS (qty 1)	$50	$50
Apple Device Manager (qty 1)	$399	$399
Apple apps (QTY 9)	$25	$225
Spare Chargers (qty 5)	$40	$200
Docking Stations (qty 9)	$85	$765
Total	$1,249	$7,489

UDF Expenses- Salaries	FTE- 2012	Salary	FTE 2013	Salary
Manager	1.0	$92,000	1.0	$102,000
Asst. Mgr	1.0	$87,000	1.0	$91,000
UDF's	15.2	$1,140,000	12.3	$922,500
Total Salary Expense		$1,319,000		$1,115,500

Net Savings $203,500

APPENDIX P

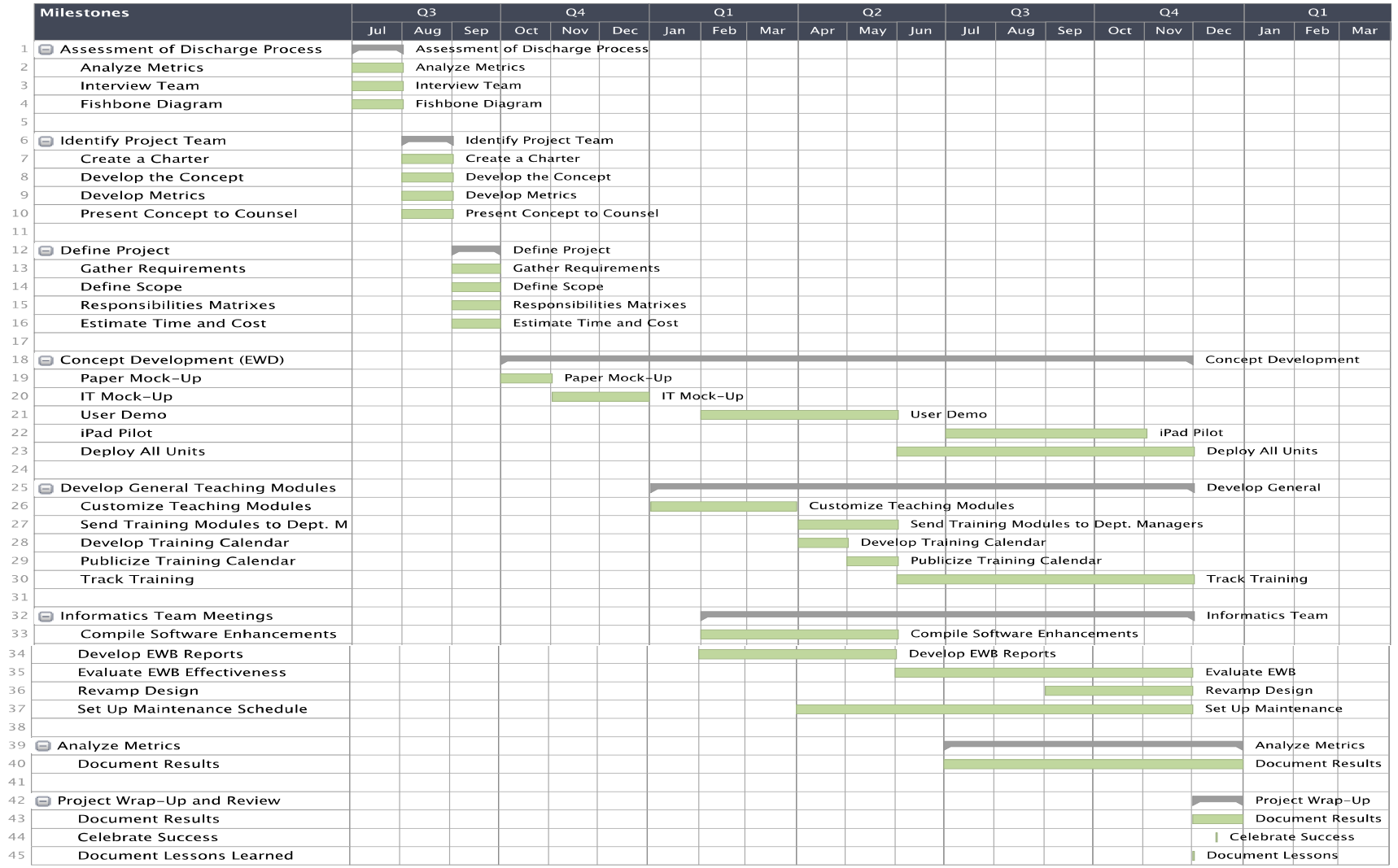
Cost Benefit Projection Schedule

Reduction in Readmits	Patients	$10,000 Month	Year
5 patients/month	5	$50,000	$600,000
10 patients/month	10	$100,000	$1,200,000

Reduction in LOS			$600 Month	Year
$600/unpaid day		Days		
Avg. 8000 Discharge days/month		30	$18,000	$216,000
		50	$30,000	$360,000
		100	$60,000	$720,000
		200	$120,000	$1,440,000
		250	$150,000	$1,800,000

*Average figure from finance department

Appendix Q UDF EWB Gantt Chart



Appendix R – UDF EWB Work Breakdown Structure

Level 1	Level 2	Level 3
1.0 Design Electronic Whiteboard	1.1 Initiation	1.1.1 Assessment & Recommendations 1.1.2 Develop Project Charter 1.1.3 Deliverable: Submit Project Charter 1.1.4 Project Sponsor Designs Project Charter 1.1.5 Charter Signed/Approved by Executive Sponsor
	1.2 Planning	1.2.1 Create Preliminary Scope Statement 1.2.2 Determine Project Work Teams 1.2.3 Project Kickoff Meeting 1.2.4 Develop Project Plan and Timeline 1.2.5 Submit Project Plan to Executive Sponsor 1.2.6 Milestone: Project Plan Approval
	1.3 Execution	1.3.1 Team Meetings Commence 1.3.2 Verify & Validate User Requirements 1.3.3 Design System 1.3.4 Procure Hardware/Software 1.3.5 Install Test System 1.3.6 Testing Phase 1.3.7 Install Live System 1.3.8 User Training 1.3.9 Go Live
	1.4 Oversight	1.4.1 Project Management 1.4.2 Project Status Meetings 1.4.3 Risk Management 1.4.4 Update Project Management Plan
	1.5 Completion	1.5.1 Audit Procurement 1.5.2 Document Lessons Learned 1.5.3 Update Files/Records 1.5.4 Gain Formal Acceptance 1.5.5 Archive Files/Documents 1.5.6 Communicate Status to Executive Sponsor

APPENDIX S

UDF Program Changes

Talking Points

Purpose:

- Increased continuity of discharge planning during the week (Monday-Friday)
- Expanded services to ICU, OBS, and during the holidays
- Each patient is prepared for discharge 1-2 days before the anticipated discharge date
- Enables HMC to meet LOS and D/C by 12 noon goals

Benefits:

- Establishes a **proactive approach** to discharge planning
- Utilizes advanced technology to stream information to/from physicians and other departments providing real time information "**at a glance**"
- Reduces the number of phone calls, voice mails, texted messages, and interruptions around discharge planning
- Assists with prioritizing discharge issues based on date and time of discharge
- Eliminates last-minute appeals for discharge orders, summaries, and referrals

UDF Electronic White Board (EWB):

- On-line application that communicates the on-going discharge status of each acute care patient via specific ICONS that alert multidisciplinary team members to specific patient needs. (see attachment)
- Vehicle for team to post and receive "notes" via the EWB for quick and brief communication about discharge alerts.
- Alerts Categories include:
    - Physician orders and clinical targets for discharge
    - Social Work needs
    - Pharmacy requirements
    - Rehab Therapy needs
    - Financial Counseling issues
    - Anticipated Discharge Date and Destination
    - Bedside nurse requirements

- Allows for Early Discharge Planning, Problem Resolution, and Outpatient Resource Management by:
    - Re-enforced patient teaching opportunities

- Timely scheduling of outpatient resources (transportation, durable medical equipment, etc.)
- Securing/confirming of intake location (family home, skilled nursing facility, half-way house, homeless shelter)
- Scheduling of personal and financial services.
- Family support/teaching

- Discharge Clinical Targets in the EWB:
  - The Clinical Targets for discharge are clinical markers that must be met before discharge, such as labs values stable, pain controlled, tubes discontinued, wounds are resolving per MD etc. Clinical targets will be identified from ORCA, CORES, and patient rounding.

What other changes?

- UDF hours will be 0800-1630
- No longer any structured UDF Huddle rounds at 0900 or 1500. However, any team member may run the EWB with UDFs between 0800 and 1630.
- Staff nurses will round with the providers as much as possible to obtain the plan for the day.
- Charge nurse and UDF will round daily on each patient to review progress toward discharge
- Using clinical targets to prepare the patient for discharge rather than "a certain number of days" in the hospital.

Metrics:

Patient Satisfaction → Discharges before Noon → Length of Stay → Re-admission Rates → Quality Discharge Indicators → PCP Identified Appointments

Appendix T

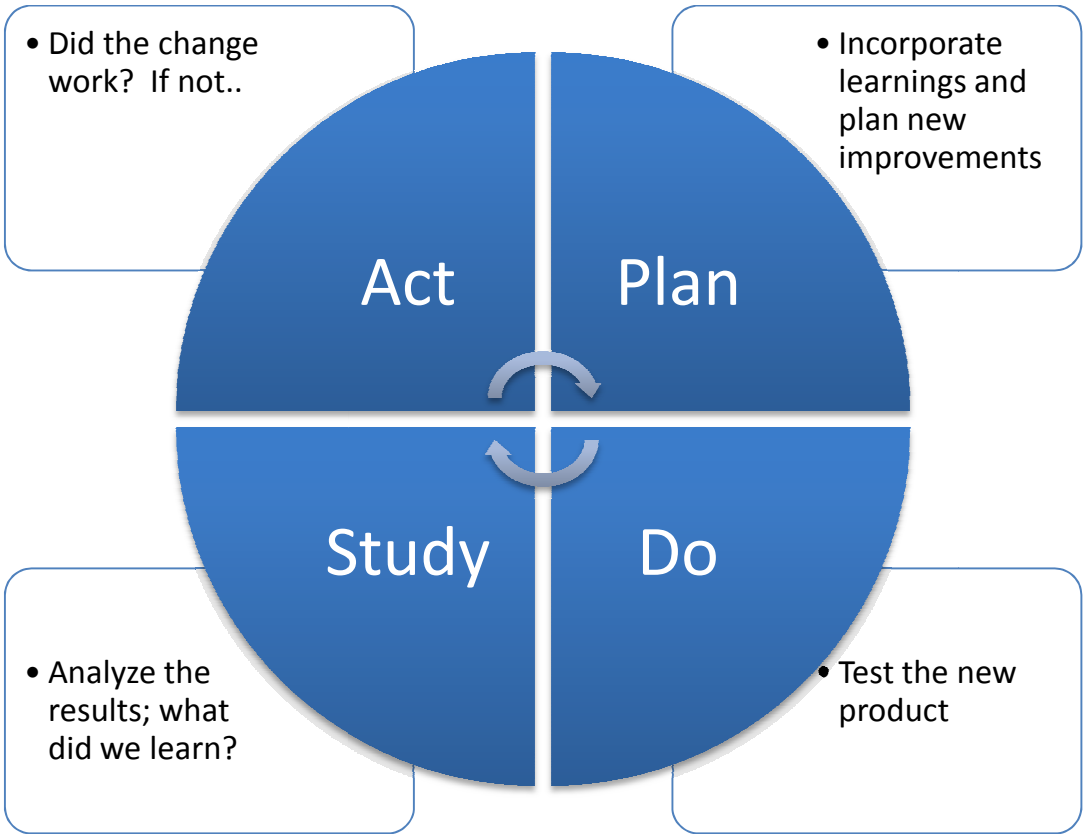
UDF EWB TRAINING SCHEDULE 2012

Start	End	Milestone	Description
3/19/12	3/31/12	Develop Master Plan education materials about UDF EWB	UDF, SW, FC, pharmacy, UM, Nurse Managers, MD, Therapies
4/2/12	4/14/12	UDF EXB Brochure "How to use guide"	Write and print UDF Brochure for staff nurses and residents
4/16/12	4/28/12	Request reports based on EWB usage from informatics	Timeframes for Notes, Rxs received-processed, usage by other services
4/30/12	5/12/12	Management Agreements	Confer w/ SW, UM, FC, Rx, NM, Therapies about EWB plan
5/14/12	5/25/12	6MB touchscreen	Install, test
5/28/12	6/8/12	Order 10 touch screens	Order, install, test on 3W (3), 3E, 4E, 5E, 6E, 7E, 8E
6/11/12	6/23/12	Train 6MB staff using Master Plan (MP)	Train: UDF, NM, ANM, Charge RNs, Therapies, FC, SW, UM, Rx
6/25/12	7/7/12	Implement touch screen on 6MB	Using the Master Plan educational materials
7/10/12	7/20/12	Evaluate UDF EWB on 6MB	Assess, revise educational materials, test measurements
7/23/12	7/28/12	Implement and educate 8E staff using MP	Educate: UDF, NM, ANM, Charge RNs, Therapies, FC, SW, UM, Rx
7/30/12	8/4/12	Implement and educate 7E staff using MP	Educate: UDF, NM, ANM, Charge RNs, Therapies, FC, SW, UM, Rx
8/6/12	8/11/12	Implement and educate 3E staff using MP	Educate: UDF, NM, ANM, Charge RNs, Therapies, FC, SW, UM, Rx
8/13/12	8/19/12	Implement and educate 4E staff using MP	Educate: UDF, NM, ANM, Charge RNs, Therapies, FC, SW, UM, Rx
8/20/12	8/25/12	Implement and educate 5E staff using MP	Educate: UDF, NM, ANM, Charge RNs, Therapies, FC, SW, UM, Rx
8/27/12	9/1/12	Implement and educate 6E staff using MP	Educate: UDF, NM, ANM, Charge RNs, Therapies, FC, SW, UM, Rx
9/4/12	9/9/12	Implement and educate 3W staff using MP	Educate: UDF, NM, ANM, Charge RNs, Therapies, FC, SW, UM, Rx

9/10/12	9/15/12	Develop physician educational MP for EWB	Develop physician educational materials for UDF EWB
9/17/12	9/22/12	Pilot MD educational materials	Educate Neurology and NSG teams to use touch screens
9/24/12	9/29/12	Evaluate MD usage of EWB	Collect and evaluate data
10/2/12	10/12/12	Meet with each chief about UDF EWB	Present educational materials, data, provide demo of EWB
10/16/12	11/10/12	Train physician teams	Present educational materials, data, provide demo of EWB
11/13/12	12/1/12	Send Catalyst Survey	Evaluate EWB outcomes
12/4/12	12/15/12	Evaluate data/ plan for pilot	Plan for pilot starting January 2013

APPENDIX U

PDSA CYCLE



APPENDIX V
Quality and Process Measures

Average LOS

Baseline	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
	5.9	6.3	5.9	6.9	6.1

Pilot	Jan-13	Feb-13	Mar-13	Ap 2013	May-13	Jun-13
	6.7	6.3	6.4	6.6	6.4	6.8

30-day All Cause Readmissions

Baseline	Oct-Dec 2011	Jan-Mar 2012	Apr-June 2012	July-Sep 2012	Oct-Dec 2012
	10.60%	9.7%	9.40%	9.40%	9.30%

Pilot	Jan-Mar 2013	Apr-June 2013
	9.40%	9.90%

Discharges by Noon

Baseline	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
	12.40%	12.40%	11.30%	12.30%	13.10%

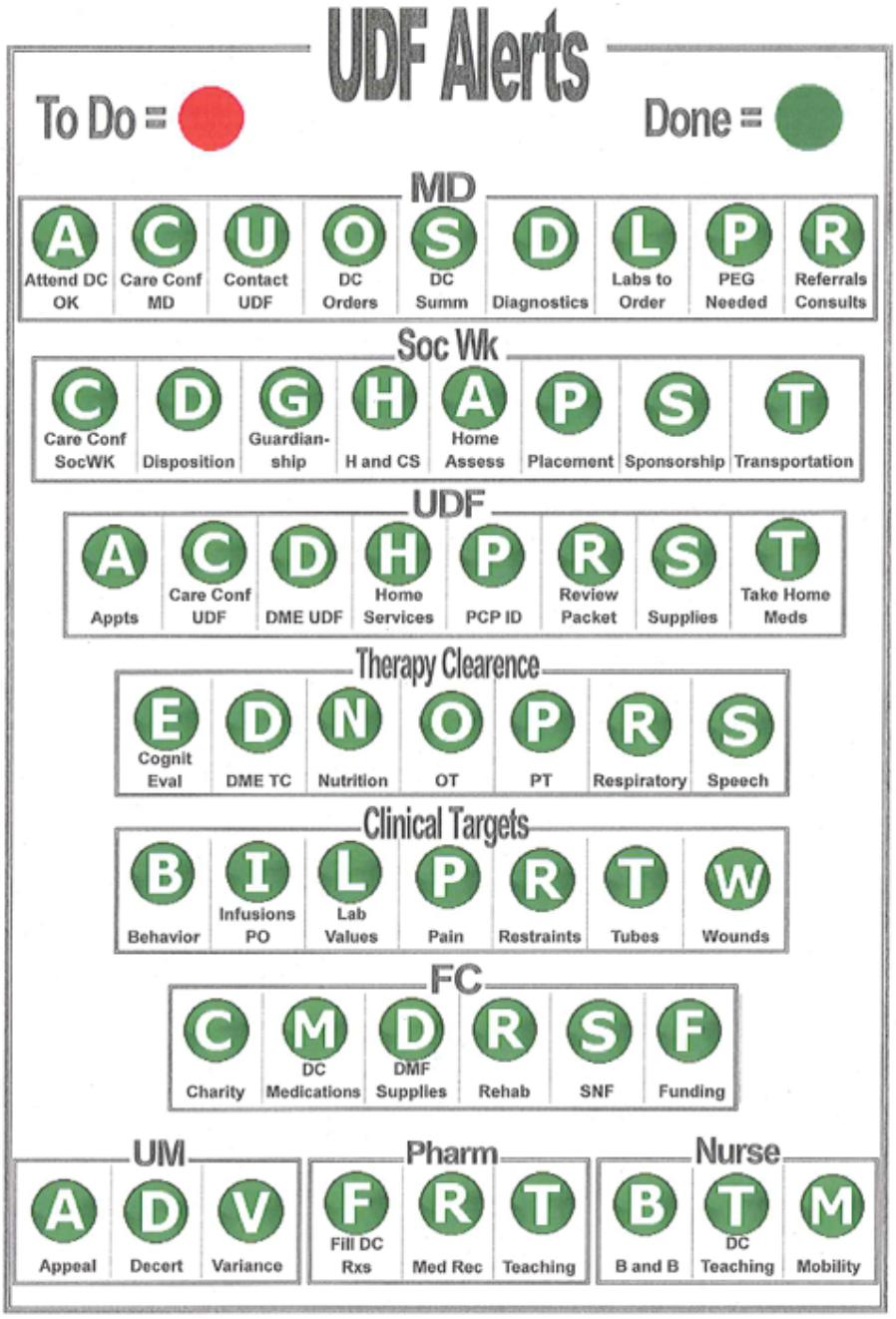
Pilot	Jan-13	Feb-13	Mar-13	Ap 2013	May-13	Jun-13
	14.60%	13.90%	12.80%	14.00%	12.00%	14.90%

Discharge Satisfaction

Baseline	Oct-Dec 2011	Jan-Mar 2012	Apr-June 2012	July-Sep 2012	Oct-Dec 2012
	85.50%	88.10%	88.60%	88.60%	88.60%

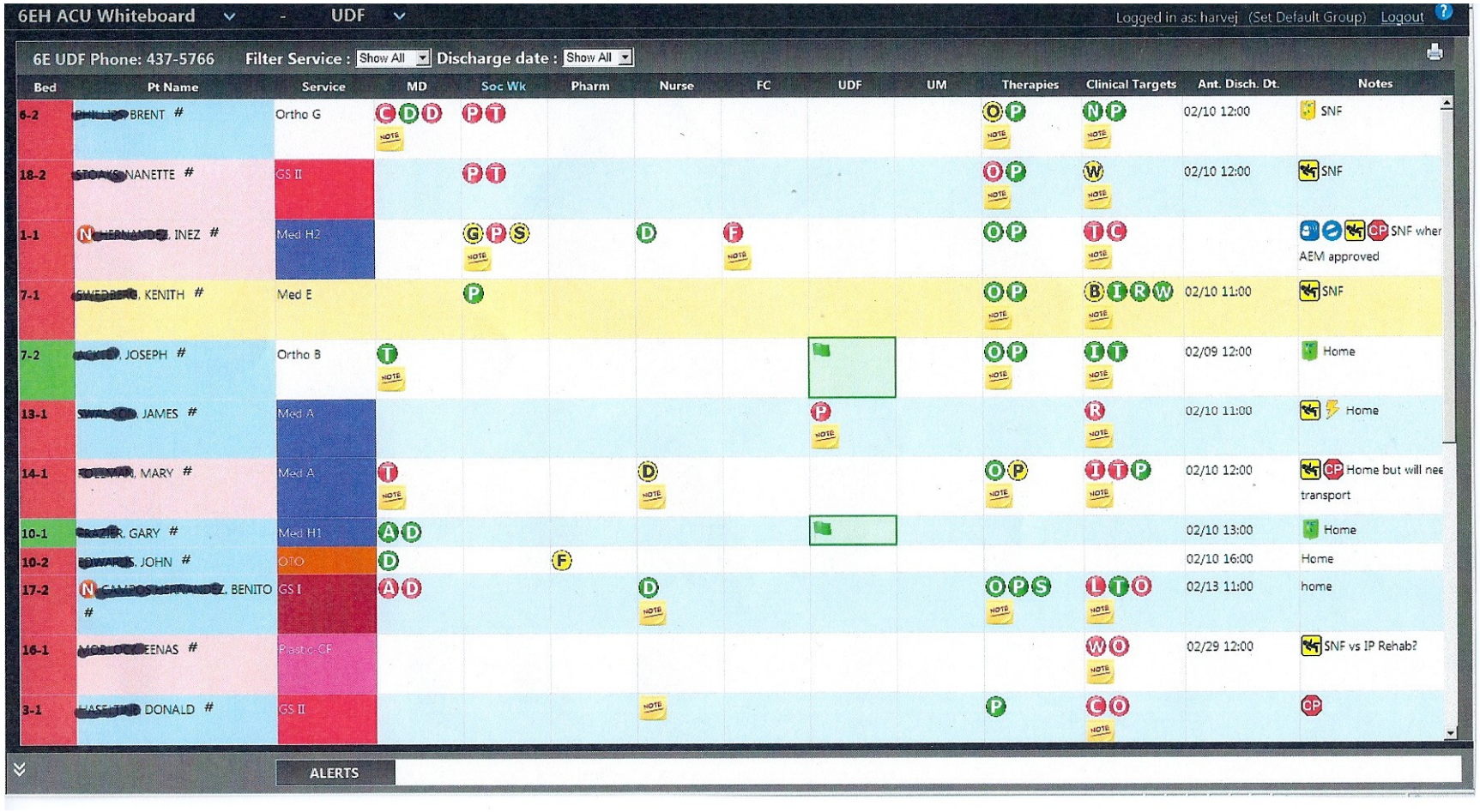
Pilot	Jan-Mar 2013	Apr-June 2013
	87.90%	90.60%

Appendix W → UDF Whiteboard Icons



APPENDIX X

UDF Electronic Whiteboard Screenshot



Appendix Y ROI

30 Day All Cause Readmissions-Cost Savings Estimate				
	July-Sep 2012	Oct-Dec2012	Jan-Mar 2013	Apr-June 2013
total Readmits	441	402	383	282
difference		39	19	101
Dollar per readmission /avg.		$10,000	$10,000	$10,000
Net Savings		$390,000	$190,000	$1,010,000

LOS Savings/Loss						
Basline	12-Aug	Sep-12	Oct-12	Nov-12	Dec-12	
Total Discharge Days	8839	8232	8191	8537	7575	
Actual LOS	5.9	6.3	5.9	6.9	6.1	
Target LOS	6.4	6.4	6.4	6.4	6.4	
extra cost per day	600	600	600	600	600	
Pilot	Jan-13	Feb-13	Mar-13	Ap 2013	May-13	Jun-13
Total Discharge Days	8428	7345	8170	8482	8412	8462
Actual LOS	6.7	6.3	6.4	6.6	6.4	6.8
Target days	8051	7462	8170	8225	8412	7964
difference/ days	377	-117	0	257	0	498
gain/loss	$226,424	-$69,952	$0	$154,218	$0	$298,659

ROI

Net Savings FTE	$100,000
Net Savings Readmit	$1,200,000
Net Loss LOS	$609,349
Total Net Savings	$690,651

Appendix Z UDF Survey Tool

Page **1** of 1

Question 1.

Considering the UDF EWB as a whole - what were its strongest (best) features?

Required.

Question 2.

Considering the UDF EWB design, what did not work well?
Required.

Question 3.

Do you recommend keeping any aspects of the current UDF EWB - why?
Required.

Question 4.

What could have been done differently in the design and deployment of the UDF EWB?
Required.

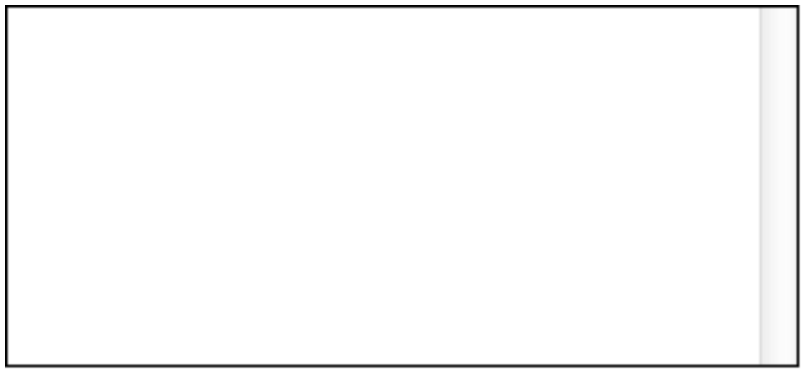
Question 5.
Please rate each design aspect of the UDF EWB on a scale of 1 (excellent) to 5(did not work at all).
Required.

	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
UDF Notes section	UDF Notes section: 1 Excellent	UDF Notes section: 2 Good	UDF Notes section: 3 Fair	UDF Notes section: 4 Poor or rarely used	UDF Notes section: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
UM Notes section	UM Notes section: 1 Excellent	UM Notes section: 2 Good	UM Notes section: 3 Fair	UM Notes section: 4 Poor or rarely used	UM Notes section: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
Therapies Notes section	Therapies Notes section: 1 Excellent	Therapies Notes section: 2 Good	Therapies Notes section: 3 Fair	Therapies Notes section: 4 Poor or rarely used	Therapies Notes section: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
Clinical targets Notes section	Clinical targets Notes section: 1 Excellent	Clinical targets Notes section: 2 Good	Clinical targets Notes section: 3 Fair	Clinical targets Notes section: 4 Poor or rarely used	Clinical targets Notes section: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**

Financial Counseling Notes section	Financial Counseling Notes section: 1 Excellent	Financial Counseling Notes section: 2 Good	Financial Counseling Notes section: 3 Fair	Financial Counseling Notes section: 4 Poor or rarely used	Financial Counseling Notes section: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
Pharmacy Notes section	Pharmacy Notes section: 1 Excellent	Pharmacy Notes section: 2 Good	Pharmacy Notes section: 3 Fair	Pharmacy Notes section: 4 Poor or rarely used	Pharmacy Notes section: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
Nursing notes section	Nursing notes section: 1 Excellent	Nursing notes section: 2 Good	Nursing notes section: 3 Fair	Nursing notes section: 4 Poor or rarely used	Nursing notes section: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
Social Work Notes section	Social Work Notes section: 1 Excellent	Social Work Notes section: 2 Good	Social Work Notes section: 3 Fair	Social Work Notes section: 4 Poor or rarely used	Social Work Notes section: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
Provider or Notes section	Provider or Notes section: 1 Excellent	Provider or Notes section: 2 Good	Provider or Notes section: 3 Fair	Provider or Notes section: 4 Poor or rarely used	Provider or Notes section: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
Anticipated Dc Date	Anticipated Dc Date: 1 Excellent	Anticipated Dc Date: 2 Good	Anticipated Dc Date: 3 Fair	Anticipated Dc Date: 4 Poor or rarely used	Anticipated Dc Date: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
Clinical Targets	Clinical Targets: 1 Excellent	Clinical Targets: 2 Good	Clinical Targets: 3 Fair	Clinical Targets: 4 Poor or rarely used	Clinical Targets: 5 Not used at all
	1 Excellent	**2 Good**	**3 Fair**	**4 Poor or rarely used**	**5 Not used at all**
Downloaded icons from the census board	Downloaded icons from the census board: 1 Excellent	Downloaded icons from the census board: 2 Good	Downloaded icons from the census board: 3 Fair	Downloaded icons from the census board: 4 Poor or rarely used	Downloaded icons from the census board: 5 Not used at all

Question 6.

Any other comments



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Submit responses

Questions or Comments?

Contact Janet Harvey at harvej@uw.edu